EXHIBIT 84 FILED UNDER SEAL

Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 2 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1	UNITED STATES I	DISTRICT COURT
2	NORTHERN DISTRICT	OF CALIFORNIA
3	SAN FRANCISO	CO DIVISION
4		_
5	WAYMO LLC,)
6	Plaintiff,)
7	vs.)Case No.:
8	UBER TECHNOLOGIES, INC.,)3:17-cv-00939-WHA
9	OTTOMOTTO LLC; OTTO TRUCKING)
10	LLC,)
11	Defendants.)
12		_)
13		
14	CONFIDENTIAL - ATTO	PRNEYS' EYES ONLY
15		
16	VIDEOTAPED DEPOSITION	OF MICHAEL LEBBY
17	San Francisco,	California
18	Monday, Apri	.1 17, 2017
19	Volum	ne 1
20		
21	Reported by:	
22	RACHEL FERRIER, CSR No. 6948	
23	Job No. 2596388	
24		
25	PAGES 1 - 80	
		Page 1

Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 3 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 A That is correct. 01:44:38	1 a fashion where there is of the boards 01:47:56
2 Q So that's not something you considered as part of 01:44:39	2 and of the boards. 01:47:59
3 your declaration? 01:44:44	3 Q And that's the same for each cavity; correct? 01:48:02
4 A That is correct. I did not consider that. 01:44:45	4 A Yes. So for the long-range cavity, a similar 01:48:07
5 Q Turning to paragraph 30 of your declaration, 01:44:47	5 situation occurs where there are lasers, and the 01:48:10
6 Exhibit 30, here your declaration is discussing - 01:45:03	6 lasers are distributed. 01:48:14
7 discussing Waymo trade secrets that you characterize as 01:45:16	7 I believe, in this case, , 01:48:18
8 the "six-board arrangement"; is that fair? 01:45:19	8 , if I 01:48:22
9 A Yeah, in line 13, I characterize Way's Waymo's 01:45:21	9 remember correctly. 01:48:27
10 system as Yes, that's 01:45:27	10 Q So, again, the Fuji device, overall, total 01:48:27
11 correct. 01:45:30	11 lasers? 01:48:31
12 Q You understand that what you have characterized 01:45:30	12 A If you add the two cavities together, lasers 01:48:32
13 as covers two distinct trade 01:45:32	13 per cavity, the Fuji device has lasers. 01:48:38
14 secrets from Waymo's trade secret list; correct? 01:45:35	14 Q You agree the design files for the transmit 01:48:42 15 boards in the Fuji system are labeled 01:48:51
15 A I've written on line 10, that covers created 01:45:38 16 Secrets No. 2 and 3. 01:45:42	15 boards in the Fuji system are labeled 01:48:51 16 correct? 01:48:53
	17 A Yeah. 01:48:53
17 I believe that's the one you are talking about; 01:45:49 18 right? 01:45:52	17 A Yean. 01:48:53 18 If you take the medium-range cavity, you will 01:48:57
19 Q Correct. 01:45:52	19 find that the the boards and I'm looking at 01:49:00
20 Is it your opinion that both Trade Secret Nos. 2 01:45:54	20 page 7, paragraph 25 of my declaration. You will see 01:49:04
21 and 3 are directed to 01:45:56	21 boards labeled for the medium-range cavity, 01:49:08
22 01:45:59	22 and they are labeled for the long-range 01:49:11
23 01:46:02	23 cavity. 01:49:14
24 01:46:06	24 Q They are not labeled and then 01:49:14
25 A I don't recall exactly what's written in the 01:46:07	25 again; correct? 01:49:18
Page 34	Page 36
1 Trade Secrets 2 or 3, but given that I've written it 01:46:09	1 A They are labeled for medium range and 01:49:19
2 down in my declaration, that's my understanding. 01:46:13	2 for long-range. 01:49:23
3 Q You agree that the Fuji device has 64 laser 01:46:15	3 Q Okay. Other than the Fuji device, is the only 01:49:23
4 diodes on transmit boards; is that fair? 01:46:29	4 other LiDAR device that you considered in connection 01:49:32
5 A The Fuji device is a different device. It has 01:46:33	5 with your declaration strike that. 01:49:35
6 boards per cavity. It has two cavities. So the 01:46:37	6 Other than the Fuji device, is the only other 01:49:39
7 Fuji device is is different compared to the Waymo 01:46:41	7 LiDAR device with 01:49:42
8 device. Fuji is 01:46:45	8 you considered in connection with your declaration the 01:49:51
9 composed of two cavities, each cavity having 01:46:49	9 Waymo GBR3 device? 01:49:53
10 boards. 01:46:53	10 MR. MUINO: Objection to the form of the 01:50:04
11 Q Looking at the Fuji device overall, you agree 01:46:53	11 question. 01:50:05
12 there's transmit boards? 01:46:56	12 THE WITNESS: Could you restate the question a 01:50:06
13 A The Fuji device has boards for medium-range 01:47:02	13 different way? 01:50:08
14 cavity and boards for a long-range cavity. If you 01:47:09	14 MR. NEWTON: Sure. 01:50:09
15 want to sum the number of boards together, there are 01:47:12	15 Q Other than GBR3 and the Fuji device, your 01:50:09
16 boards, but there are two cavities and has two different 01:47:16	16 declaration does not identify any other LiDAR systems 01:50:12
17 designs, and each cavity has boards, so the way I 01:47:21	17 that 01:50:14
18 look at this is boards per cavity. 01:47:24	18 01:50:19
19 Q Each of those boards has laser 01:47:27	19 A I believe the answer is correct. I didn't see 01:50:20
20 diodes; correct, in the Fuji device? 01:47:35	20 other channel units that had either 01:50:22
21 A The Fuji device, if you are talking about one 01:47:37	21 01:50:28
22 cavity, one cavity let's take the medium-range cavity 01:47:43	22 Q If you look at paragraph 31, the Velodyne HDL 64 01:50:32
23 has boards. On the boards, we have a total 01:47:48	23 LiDAR system, this is one of the ones you considered as 01:50:37
24 of lasers. 01:47:50	24 part of your declaration? 01:50:40
25 My understanding is the lasers are distributed in 01:47:52	25 A It is my understanding that the Velodyne has 64 01:50:41
Page 35	Page 37

Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 4 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 abannola or lata say itla 64 lagora 01,50,52	1 DCDs was limited by well because design considerations for 01.52.50
1 channels or let's say it's 64 lasers. 01:50:52 2 O And in the Velodyne system, each of those 64 01:50:58	1 PCBs was limited by well-known design considerations for 01:53:59
	2 automotive LiDARs. 01:54:00
3 lasers is on its own transmit PCB; is that correct? 01:51:04 4 A I don't know the actual layout of the Velodyne 01:51:07	3 Do you see that? 01:54:01 4 A I do see that. 01:54:02
5 system other than what I've seen in the '190 patent, 01:51:11	
	5 Q Do you know when Waymo first decided to develop a 01:54:03
6 which is the Velodyne patent, and in the '190 patent, 01:51:15	6 64-laser LiDAR system? 01:54:07
7 there are 32 transmit boards and 32 receive boards. The 01:51:19 8 patent discusses one laser per board, but it also 01:51:27	7 A It may have been in some of the documents I've 01:54:08
• •	8 read, but I don't recall any dates to give you an answer 01:54:27
9 discusses a potential for two lasers per board, so I 01:51:30	9 to that question. 01:54:30
10 don't know if the '190 patent is related to the HDL 64 01:51:33	10 Q Does sound approximately right? 01:54:31
11 or not. 01:51:37	11 A I probably need to look at the documents. I 01:54:35
12 Q Okay. Fair enough. 01:51:37	12 don't recall that level of detail. 01:54:40
You agree that one possible arrangement of the 01:51:41	13 Q Okay. So assuming it would be writer, what 01:54:41
14 LiDAR device with 64 lasers is one laser per board? 01:51:44	14 I want to get at is that your declaration mentions 01:54:49
15 A Yeah. Hypothetically, yes, you could have 64 01:51:48	15 this this point where Waymo had decided to develop a 01:54:52
16 lasers, each having one laser per board. Yes, that is 01:51:51	16 64-laser LiDAR; is that correct? 01:54:55
17 one hypothetical situation. 01:51:56	17 A I certainly mentioned, on line 24 on page 8, that 01:54:57
18 Q And another one would be 21 or 22 laser diodes on 01:51:58	18 Waymo decided to develop a 64-laser LiDAR, yes. 01:55:04
19 three boards? 01:52:03	19 Q Okay. And regardless of whether that was 01:55:07
20 A Yeah. That is another configuration that is 01:52:04	or another time, your declaration doesn't cite any 01:55:12
21 possible too, yes. 01:52:15	21 independent evidence to show that there were well-known 01:55:16
22 Q Another configuration is 16 laser diodes on four 01:52:16	22 design considerations for automotive LiDARs at that 01:55:18
23 boards? 01:52:21	23 time; is that fair? 01:55:21
24 A Yeah. There is there are a number of 01:52:24	24 A Well, considerations for LiDARs are as far as 01:55:23
25 different ways you can break up 64 lasers. As you say, 01:52:30 Page 38	25 I can tell, from reading the documents I've seen, you 01:55:33 Page 40
1 age 30	1 age 40
1 you could have 64 lasers on 64 boards at one extreme, 01:52:35	1 know, one of the industry-leading LiDARs at the time was 01:55:38
2 and the other extreme, you could have one board with 64 01:52:39	2 the Velodyne, and the Velodyne, as we said earlier, had 01:55:40
3 lasers on it. 01:52:42	3 one laser per board. The '190 patent shows 32 boards on 01:55:44
4 Both of those situations are, from my standpoint, 01:52:43	4 one side for the laser and 32 boards on the other side 01:55:50
5 problematic from an engineering perspective, and there 01:52:49	5 for the photodetector. It's my understanding that the 01:55:53
6 are certainly other configurations that you just 01:52:52	6 alignment of the boards was actually difficult and 01:55:55
7 mentioned. 01:52:55	7 time-consuming. 01:55:59
8 Q Would you agree that an eight-by-eight 01:52:55	8 And so I don't know the details of the design 01:56:00
9 arrangement would be less problematic from an 01:52:57	9 team's work here, but certainly from my perspective, you 01:56:05
10 engineering standpoint? 01:53:00	10 would want to look for easier ways to align the 01:56:09
11 A I haven't seen all the engineering parameters. 01:53:01	11 channels. 01:56:12
You know, when you are designing an engineering 01:53:08	12 Q Okay. And you didn't cite the Velodyne patent as 01:56:13
13 system, it's not just the number of boards or the optics 01:53:10	13 a specific example of a well-known design consideration 01:56:20
14 or the lasers or the photodetectors. You have to look 01:53:13	14 for automotive LiDAR? 01:56:24
15 at the cost of the unit, and you have to look at the 01:53:16	15 A It's not cited in paragraph 32, but I believe it 01:56:25
16 size considerations, and you also have to look at things 01:53:18	16 may be cited elsewhere. I've actually cited it in 01:56:29
17 like thermal loaded, as well as yield of the lasers once 01:53:22	17 paragraph 38. So the patent has been cited in my 01:56:41
18 you put them down onto the boards. 01:53:28	18 declaration. 01:56:47
19 These engineering considerations have to be taken 01:53:30	19 Q Right. 01:56:47
20 into effect, and I don't believe I've been exposed to 01:53:33	But not cited to say that here's an example of a 01:56:48
21 all those details at this time. 01:53:36	21 well-known design consideration for automotive LiDARs; 01:56:53
21 all those details at this time. 01:53:36 22 Q Okay. In paragraph 32 of your declaration, you 01:53:39	21 well-known design consideration for automotive LiDARs; 01:56:53 22 is that fair? 01:56:57
	_
22 Q Okay. In paragraph 32 of your declaration, you 01:53:39	22 is that fair? 01:56:57 23 A Yeah, I think that's probably a fair comment, 01:56:58
22 Q Okay. In paragraph 32 of your declaration, you 01:53:39 23 say: Once Waymo had decided to develop a 64-laser 01:53:44	22 is that fair? 01:56:57 23 A Yeah, I think that's probably a fair comment, 01:56:58

Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 5 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 not be ideal for automotive LiDARs due to size 02:05:07		
3 A Size considerations is one of the issues if you 02.05:11 3 any in alignment over the course of a lifetime of the 02.08:10 5 have to be careful of is these lawer are high power 02.05:21 5 have to be careful of is these lawer are high power 02.05:21 5 have to be careful of is these lawer are high power 02.05:21 5 6 hasens, and so there's going to be thermal effects, and 02.05:25 7 he thermal effects will translate into board warpage, 02.05:25 7 he thermal effects will translate into board warpage, 02.05:25 7 he thermal effects will translate into board warpage, 02.05:25 7 and if the board warps, then everything goes out of 02.05:31 8 more board, being in the point warps, then everything goes out of 02.05:31 9 alignment, so not only is if a size issue, it is a 02.05:38 1 manufacturing yield issue, because you are going to get 02.05:41 12 here is, you know, reasonable chance that one of them 02.05:41 13 here is, you know, reasonable chance that one of them 02.05:41 13 here is, you know, reasonable chance that one of them 02.05:41 13 here is, you know, reasonable chance that one of them 02.05:41 13 here is, you know, reasonable chance that one of them 02.05:51 15 board for rework. 02.05:55 15 board for rework. 02.05:51 15 board for rework. 02.06:20 17 what I believe paragraph 33 of your declaration 02.06:11 15 board for rework. 02.06:20 17 what I believe paragraph 33 - size is 02.06:20 17 what I believe paragraph 33 - size is 02.06:20 18 here is, you know 02.05:31 18 here is, yo	2 considerations; correct? 02:05:11	1 Q You have to account for with more boards? 02:08:01
4 had 64 lasers on a board, but the other thing you would 0.20516 5 have to be careful of it face laser and shelphower 0.205216 5 have to be careful of it face laser and shelphower 0.205216 6 lasers, and so ther's going to be thermal effects, and 0.205216 7 the thermal effects will translate into board warpage, 0.205228 8 and if the board warps, then everything goes out of 0.205316 10 thermal issue and, I would say, may even be a 0.205316 10 thermal issue and, I would say, may even be a 0.205316 11 thermal issue and, I would say, may even be a 0.205316 12 64 lasers dye bonded to the board all perfectly, and 0.20545 13 64 lasers dye bonded to the board all perfectly, and 0.20545 14 fave is, you know, reasonable chance that one of them 0.20545 15 board for rework. 15 board for rework. 16 Q Okus, So focasing just on size – and thar's 0.20545 17 what I believe paragraph 33 of your declaration 0.206410 18 addresses; right? I know you go on to mention thermal 0.206410 19 considerations, but just looking at 33, you are laiking 0.206410 20 about size? 20 about size? 21 A Yes – well, I discuss in paragraph 33 – size is 0.206420 22 certainly one of the parameters that has to be taken 0.206429 23 into account to design, left seall it, efficient LiDAR 0.20643 24 systems. 25 Q You say that use of larger PCB with numerous paragraph 35 of your declaration of making 0.20644 2 is that right? 26 A Well, yes, if you had larger boards, then the 0.20644 3 A Well, yes, if you had larger boards, then the 0.20644 4 housing most likely would have to be bigger, but I can't 0.20643 5 comment on that because I haver't really designed the 0.206546 6 housing, and maybe there's some immovative way to — 0.207326 10 loans and maybe there's some immovative way to — 0.207326 10 housing and maybe there's some immovative way to — 0.207326 10 housing and maybe there's some immovative way to — 0.207326 10 housing and maybe there's some immovative way to — 0.207326 10 housing, and maybe there's some immovative way to — 0.206454 10 housing and maybe t	The state of the s	2 A Well, physical alignment, and will the boards 02:08:03
5 have to be careful of is these laser are high-power 02:05:21 6 lasers, and so there's going to be thermal offects, and 02:05:26 6 lasers, and so there's going to be thermal offects, and 02:05:26 7 the thermal effects will translate into board warps, then everything goes out of 02:05:38 8 and if the board warps, then everything goes out of 02:05:38 9 alignment, so not only is it a size issue, it's a 02:05:36 10 thermal issue and, I would say, may even be a 02:05:38 11 manufacturing yield issue, because you are going to get 02:05:38 13 there is, you know, reasonable chance that one of them 02:05:41 14 may not yield right, and that would add cust to the 02:05:51 15 Qo law, So focusing just on size — and that's 02:05:55 16 QO law, So focusing just on size — and that's 02:05:55 17 what I believe paragraph 33 or your declaration 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 21 A Yes — well, I discuss in paragraph 33 — size is 02:06:20 22 certainly one of the parameters that has to be taken 02:06:37 23 Q You say that use of larger PCB with numerous 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 5 comment on that beasues I havert really designed the 02:06:54 5 comment on that beasues I havert really designed the 02:07:05 9 Q Is it fin, though, that if you had the same 02:07:08 9 Q Is it fin, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them more views to really designed the 02:06:54 11 have of alsease on one board on one currence. On the 02:07:55 12 A Same number of lasers on smaller boards need more 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:25 15 Oher extreme, you could have 64 boards with each having 02:07:05 15 Oher extreme, you could have 64 boards with each having 02:07:05 15 A Well, you have got — 02:07:55 24 Q And there's also a physical alignm	3 A Size considerations is one of the issues if you 02:05:11	3 stay in alignment over the course of a lifetime of the 02:08:07
6 lasers, and so there's going to be thermal effects, and 02:05:25 7 the thermal effects will translate into board warpage, 02:05:28 8 and if the board warps, then everything goes out of 20:205:38 9 alignment, so not only is 'is a size issue, it's a 02:05:36 10 thermal issue and, I would say, may even be a 02:05:36 10 thermal issue and, I would say, may even be a 02:05:31 12 64 lasers dye bonded to the board all perfectly, and 02:05:45 13 there is, you know, reasonable chance that one of them 02:05:41 14 may not yield right, and that would add cost to the 02:05:51 15 board for rework. 02:05:55 17 what I believe paragraph 33 of your declaration 02:06:10 18 addresses; right? I know you go on to meniton thermal 02:06:14 19 addresses; right? I know you go on to meniton thermal 02:06:14 20 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 02:06:22 21 A Yes – well, I discuss in paragraph 33 - size is 02:06:23 22 extrainly one of the parameters that has to be taken 02:06:37 23 wystems. 02:06:37 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 26 (Recess taken) 02:08:49 27 (Recess taken) 02:08:49 28 into account to design, lefts call it, efficient LIDAR 02:06:31 29 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 Comments on that because I haven't really designed to 02:00:58 6 housing, and maybe there's some inmovative way to	4 had 64 lasers on a board, but the other thing you would 02:05:16	4 LiDAR. 02:08:10
7 the thermal effects will translate into board warpage, 02.05.28 8 and if the board warps, then everything goes out of 02.05.33 8 8 more boards, then your testing and alignment costs are 02.05.21 10 thermal issue and, I would say, may even be a 02.05.38 10 thermal issue and, I would say, may even be a 02.05.38 11 manufacturing yield issue, because you are going to get 02.05.41 12 6d hasers dye bonded to the board all perfectly, and 02.05.45 11 4 the problem of large size thermal loading and warpage of 02.08.29 12 due board to go out of alignment. 02.08.38 13 here is, you know, reasonable chance that one of them 02.05.45 11 4 the problem of large size thermal loading and warpage of 02.08.43 13 here is, you know, reasonable chance that one of them 02.05.45 11 4 the problem of large size thermal loading and warpage of 02.08.43 13 here is, you know, reasonable chance that one of them 02.05.45 11 4 the problem of large size thermal loading and warpage of 02.08.43 13 here is, you know, reasonable chance that one of them 02.05.45 11 4 the problem of large size thermal loading and warpage of 02.08.43 12 due board to go out of alignment. 02.08.43 13 here is, you know, reasonable chance that one of them 02.05.55 11 4 the problem of large size thermal loading and warpage of 02.08.43 13 here is, you know, reasonable chance that one of them 02.05.55 11 4 the problem of large size thermal loading and warpage of 02.08.43 13 here is, you know, reasonable of the board one of alignment. 02.08.43 13 here is, you know, reasonable of the barral loading and warpage of 02.08.43 13 here is, you for one of larger PCB with numerous 02.06.51 14 here of a larger LiDAR housing; 02.06.51 14 the problem of large size thermal load 02.02.08 12 12 here odd. 02.06.20 12 12 12 12 12 12 12 12 12 12 12 12 12	5 have to be careful of is these laser are high-power 02:05:21	5 Q So in terms of the alignment, both physical and 02:08:10
8 and if the board warps, then everything goes out of 02:05:33 9 alignment, so not only is it a size issue, it's a 02:05:34 9 alignment, so not only is it a size issue, it's a 02:05:34 10 thermal issue and, I would say, may even be a 02:05:35 11 manufacturing yield issue, because you are going to get 02:05:45 12 6et lasers dye bonded to the board all perfectly, and 02:05:45 13 there is, you know, reasonable chance that one of therm 02:05:45 13 there is, you know, reasonable chance that one of therm 02:05:45 15 board for rework. 14 may not yield right, and that would add cost to the 02:05:51 15 board for rework. 15 board for rework. 16 Q Okay. So focusing just on size — and that's 02:05:56 17 whant I believe paragraph 33 of your declaration 02:06:10 18 addressess; right? I know you go not no mention thermal 02:06:10 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:12 21 A Ves — well, I discuss in paragraph 33 - size is 02:06:20 22:06:14 22 20 certainly one of the parameters that has to be taken 02:06:31 24 kystems. 02:06:34 4 ystems. 02:06:34 24 systems. 02:06:34 24 systems. 02:06:34 24 systems. 02:06:44 4 housing most likely would necessitate a larger LIDAR housing; 02:06:44 4 housing most likely would have to be bigger, but I cart 02:06:45 5 to — to deal with larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I cart 02:06:45 5 to — to deal with larger boards, then the 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 15 numbers of lasers on one board on one extreme. On the 02:07:26 15 10 boards, you would need more boards? 02:07:15 12 A	6 lasers, and so there's going to be thermal effects, and 02:05:25	6 optical, more boards probably means more complexity? 02:08:13
9 alignment, so not only is it a size issue, it's a	7 the thermal effects will translate into board warpage, 02:05:28	7 A Well, the way I would look at this is if you have 02:08:18
10 thermal issue and, I would say, may even be a 11 manufacturing yield issue, because you are going to get 02:05:38 13 there is, you know, reasonable chance that one of them 12:05:49 13 there is, you know, reasonable chance that one of them 12:05:51 15 bard for revorch. 15 bard for revorch. 16 Q Okay. So focusing just on size — and that's 17 what I believe paragraph 33 of your declaration 17 what I believe paragraph 33 of your declaration 18 addresses; right? I know you go not mention thermal 18 2:06:10 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 33, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19 considerations, but just looking at 34, you are talking 19	8 and if the board warps, then everything goes out of 02:05:33	8 more boards, then your testing and alignment costs are 02:08:21
11 manufacturing yield issue, because you are going to get 02:05:45 12 64 lasers dye bonded to the board all perfectly, and 02:05:45 13 here is, you know, reasonable chance that one of them 02:05:45 14 may not yield right, and that would add cost to the 02:05:55 15 board for rework. 02:05:55 16 Q Okay. So focusing just on size — and that's 02:05:56 17 what I believe paragraph 33 of your declaration 02:06:10 18 addresses; right? I know you go on to mention thermal 02:06:11 18 addresses; right? I know you go on to mention thermal 02:06:12 20 about size? 02:06:20 21 A Yes — well, I discuss in paragraph 33 — size is 02:06:20 22 certainly one of the parameters that has to be taken 02:06:20 23 into account to design, lefts call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 5 comment on that because I haven't really designed the 02:07:02 8 speaking, size would be an issue. 02:07:05 7 to — to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 10 housing, and maybe there's some innovative way to — 02:07:55 10 boards. So, yeah, that's — hypothetically, you could 02:07:23 11 have a differed an opinion in 02:20:24 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's — hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:24 15 other extreme, you could have 64 boards with each having 02:07:32 16 one laser. 02:00 have 9 could have 64 boards with each having 02:07:32 14 have a difficult alignment issue. Now you are aligning 02:07:33 15 boards. So, Quah, that's — hypothetically, you could 02:07:23 16 cone laser. 02:00 have 64 boards with each having 02:07:23 17 Q So when you add more boards, you ware aligning 02:07:33 18 to increase in some dimen	9 alignment, so not only is it a size issue, it's a 02:05:36	9 going to go higher. If you have one board, your 02:08:26
12 64 lasers dye bonded to the board all perfectly, and 02:05:45 13 there is, you know, reasonable chance that one of them 02:05:54 15 board for rework. 02:05:55 15 board for rework. 02:05:55 15 Q Okay. So focusing just on size and that's 02:05:56 16 Q Okay. So focusing just on size and that's 02:05:56 17 what I believe paragraph 33 of your declaration 02:06:10 18 addresses; right? I know you go on to mention thermal 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 2 20 etrainly one of the parameters that has to be taken 02:06:29 22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 2 is that right? 02:06:44 3 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I have threally designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 pcaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:23 11 boards. So, yeah, that's hypothetically, you could 02:07:23 12 A Same number of lasers on one board on one extreme. On the 02:07:23 18 to increase in some dimension; fair? 02:07:32 19 A Yeah, your if you have got 64 boards with each having 02:07:33 21 A Yeah, your if you have got 64 boards, yes, you 02:07:35 22 A Q And there's also a physical alignment; correct? 02:07:57 23 A Well, you have a size issue, but you also have probably 02:07:73 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 A when the control in the control in the out of the parameters of laser and that it is important to 02:02:19 24 C A same an engineering 02:08:49 25 In the boards in one of the par	10 thermal issue and, I would say, may even be a 02:05:38	10 alignment cost is going to go down, but then you have 02:08:29
13 there is, you know, reasonable chance that one of them 02:05:49 14 may not yield right, and that would add cost to the 02:05:55 15 hoard for rework.	11 manufacturing yield issue, because you are going to get 02:05:41	11 the problem of large size thermal loading and warpage of 02:08:32
14 may not yield right, and that would add cost to the 02:05:51 15 board for rework. 02:05:55 15 Q Olay. 02:08:43 15 board for rework. 02:05:55 17 what I believe paragraph 33 of your declaration 02:06:10 18 addresses; right? I know you go on to mention thermal 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:10 20 about size? 02:06:20 22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LIDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 Page 46 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 2 is that right? 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:55 5 10 paragraph 35, I'm indicating - agreeing with 02:20:15 5 2 ownsten to that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to - 02:06:58 10 hours fair, size would be an issue. 02:07:08 9 Q Is it fair, though, that if you had the same 02:07:08 11 boards, you would need more boards? 02:07:02 11 boards, you would need more boards? 02:07:32 11 boards, you would need more boards? 02:07:32 18 to here extreme, ou could have 64 boards with each having 02:07:23 18 to increase in some dimension; fair? 02:07:32 18 to increase in some dimension; fair? 02:07:33 18 to increase in some dimension; fair? 02:07:34 18 to increase in some dimension; fair? 02:07:34 19 A Yeah, your - if you have got 64 boards, yes, you 02:07:34 10 augment. 10 and 10 accounts of the boards on physical alignment. 02:07:34 20 A Q And there's also a physical alignment; correct? 02:07:57 25 and the boards on physical alignment; correct? 02:07:57 25 and the boards in in a reasonable size. You could 22:11:5 2 may have a size issue, but you also have - probably 02:07:34 20 across the the beards in in a reasonable size. You could 22:11:5 2 what is really important is to make sure that you 02:21:13 2 to what is really important is to make sure that you 02:21:13 2 to what is really	12 64 lasers dye bonded to the board all perfectly, and 02:05:45	12 the board to go out of alignment. 02:08:38
15 board for rework. 16 Q Okay. So focusing just on size — and that's 02:05:56 17 what I believe paragraph 33 of your declaration 02:06:10 18 addresses; right? I know you go on to mention thermal 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 21 A Yes — well, I discuss in paragraph 33 - size is 02:06:20 22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 25 Q You say that use of larger PCB with numerous 02:06:38 26 A Set right? 27 Q You say that use of larger PCB with numerous 02:06:40 28 laster diodes would necessitate a larger LiDAR housing; 02:06:40 29 is that right? 30 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to — 02:06:55 7 to — to deal with larger boards, but, generally 02:07:08 9 Q Is it fair, though, that if you had the same 02:07:08 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:32 14 have 64 lasers on one board on one extreme. On the 02:07:28 15 to ther extreme, you could have 64 boards with each having 02:07:28 16 to the receive of lasers and you wanted to put them on smaller 02:07:12 1A Yes in the recent of laser so maniler boards need more 02:07:28 1B to increase in some dimension; fair? 02:07:32 1B to increase in some dimension; fair? 02:07:32 1B to increase in some dimension; fair? 02:07:32 1B to increase in some dimension; pair 02:07:34 1A have 64 lasers on one board on one extreme. On the 02:07:28 1B and addresses in some dimension; fair? 02:07:34 1A what is really well have to take a break? 02:08:52 1D A Well, you have a size is laken to 20:06:18 1C A Is it possible to take a break? 02:08:52 1D (Recess taken.) 02:08:55 1D (Recess taken.) 02:08	13 there is, you know, reasonable chance that one of them 02:05:49	So in both extremes, from an engineering 02:08:40
16 Q Okay. So focusing just on size — and that's	14 may not yield right, and that would add cost to the 02:05:51	14 standpoint, you may run into problems. 02:08:43
17 What I believe paragraph 33 of your declaration 02:06:10	15 board for rework. 02:05:55	15 Q Okay. 02:08:45
18 addresses; right? I know you go on to mention thermal 02:06:14 19 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 02:06:29 21 A Yes well, I discuss in paragraph 33 size is 02:06:29 22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 Page 46 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 2 is that right? 02:06:44 3 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:45 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some imnovative way to - 02:06:58 7 to - to deal with larger boards, but, generally 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:18 10 boards, you would need more boards? 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 17 Q So when you add more boards, your vaize is going 02:07:25 18 to increase in some dimension; fair? 02:07:32 19 A Yeah, your if you have got 64 boards yets, you 02:07:32 20 may have a size issue, 02:06:59 21 ITHE VIDEOGRAPHER: R is 2:08. We are going off 02:08:55 20 (Recess taken.) 02:08:55 21 THE VIDEOGRAPHER: R is 2:08. We are going off 02:08:55 20 (Recess taken.) 02:08:55 21 THE VIDEOGRAPHER: We are base on the record. 02:20:06 22 ITS 2:00. The VIDEOGRAPHER: We are base on the record. 02:20:06 23 BY MR. NEWTON: 10 scale on firmed an opinion in 02:20:13 24 Q In the VIDEOGRAPHER: We are base on the record. 02:20:06 25 BY MR. NEWTON: 10 scale on firmed an opinion in 02:20:13 26 Well, You have a larger LiDAR housing; 02:06:54 27 In paragraph 35 of your declaration that it is important to 02:20:16 28 BY MR. NEWTON: 10 scale on firm	16 Q Okay. So focusing just on size and that's 02:05:56	16 A Is it possible to take a break? 02:08:49
19 considerations, but just looking at 33, you are talking 02:06:18 20 about size? 02:06:20	17 what I believe paragraph 33 of your declaration 02:06:10	17 Q Absolutely. 02:08:51
20 about size? 02:06:20 21 A Yes - well, I discuss in paragraph 33 size is 02:06:20 22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:40 26 is that right? 02:06:44 27 a Nell, yes, if you had larger boards, then the 02:06:44 3 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:22 14 A Yes. 02:07:32 15 Q You say that use of larger PCB with numerous 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 5 comment on that because I haven't really designed the 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:15 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:25 15 other extreme, you could have 64 boards with each having 02:07:24 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:45 20 one have 64 boards as opposed to one board. That's optical 02:07:44 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 (4 boards as opposed to	18 addresses; right? I know you go on to mention thermal 02:06:14	18 THE VIDEOGRAPHER: It is 2:08. We are going off 02:08:52
21 A Yes — well, I discuss in paragraph 33 — size is 02:06:20 22 certainly one of the parameters that has to be taken 02:06:31 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 Page 46 1 laser diodes would necessitate a larger LiDAR housing; 02:06:40 2 is that right? 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:07:05 6 housing, and maybe there's some innovative way to — 02:07:05 7 to — to deal with larger boards, but, generally 02:07:05 8 speaking, size would be an issue. 02:07:05 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's — hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:23 17 Q So when you add more boards, your size is going 02:07:32 18 to increase in some dimension; fair? 02:07:32 19 A Yeah, your — if you have got 64 boards, yes, you 02:07:34 20 may have a size issue, but you also have — probably 02:07:45 21 A Well, you have got — 02:07:53 22 A Well, you have got — 02:07:54 23 Lighthye-ight to resure an evil — even themthal load 02:20:04 24 Q Dr. Lebby, you also offered an opinion in 02:20:13 25 paragraph 35 of your declaration that it is important to 02:20:18 2 diodes per PCB to ensure an evil — even themthal load 02:20:18 2 diodes per PCB to ensure an evil — even themthal load 02:20:05 3 across the PCBs; is that correct? 02:20:26 4 A Yes. 4 A Yes. 5 comment on that because I haven't really designed the 02:20:55 5 In paragraph 35, I'm indicating — agreeing with 02:20:32 5 Very that if it is inportant to 02:20:40 5 In paragraph 35, I'm indicating — agreeing with 02:20:32 5 Very that it is inportant in the very three in the paragraph 35, I'm indicating — agreeing with 02:20:20:32 5 In paragraph 35, I'm indicating — a	19 considerations, but just looking at 33, you are talking 02:06:18	19 the record. 02:08:55
22 certainly one of the parameters that has to be taken 02:06:29 23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:38 Page 46 1 laser diodes would necessitate a larger LiDAR housing; 02:06:40 2 is that right? 02:06:44 3 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:55 6 housing, and maybe there's some innovative way to - 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on one board on one extreme. On the 02:07:28 13 boards. So, yeah, that's - hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:36 15 other extreme, you could have 64 boards with each having 02:07:32 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:34 20 may have a size issue, but you also have - probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 (4 p And there's also a physical alignment; correct? 02:07:54 23 hWell, you have got 64 boards method of the order of the object of the ob	20 about size? 02:06:20	20 (Recess taken.) 02:08:55
23 into account to design, let's call it, efficient LiDAR 02:06:31 24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous 02:06:48 26 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 27 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 28 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 39 A Well, yes, if you had larger boards, then the 02:06:44 40 housing most likely would have to be bigger, but I can't 02:06:44 41 housing most likely would have to be bigger, but I can't 02:06:45 43 comment on that because I haven't really designed the 02:06:56 44 housing, and maybe there's some innovative way to 45 02:06:56 46 housing, and maybe there's some innovative way to 46 housing, size would be an issue. 02:07:05 48 speaking, size would be an issue. 02:07:05 49 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:23 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 20 64 boards as opposed to one board. That's optical 02:07:54 20 A Well, you have got 02:07:57 21 C Q All the boards in in a reasonable size. You can 02:21:24 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 Total may be a size issue, but you also have 02:07:57 26 Total may be a size issue, but you also have 02:07:58 27 Total may be a size issue, but you also have 02:07:38 28 Q I a sit fair to say that all	21 A Yes well, I discuss in paragraph 33 size is 02:06:20	21 THE VIDEOGRAPHER: We are back on the record. 02:19:55
24 systems. 02:06:37 25 Q You say that use of larger PCB with numerous Page 46 1 laser diodes would necessitate a larger LiDAR housing; 02:06:44 2 is that right? 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 10 houser of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:15 13 boards. So, yeah, that's hypothetically, you could 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:26 15 other extreme, you add more boards, your size is going 02:07:33 17 Q So when you add more boards, your size is going 02:07:36 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yea, you does do no no extreme. On the 02:07:42 20 may have a size issue, but you also have probably 02:07:45 21 A Well, you have got of 64 boards, personally of the probably 02:07:45 22 A Well, you have got of 02:07:57 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 To to deal with larger boards. Page 48 26 doerds an opinion in 02:20:18 26 paragraph 35 of your declaration that it is important to 02:20:16 27 Page 48 28 Q In the an equal or approximately equal number of laser over thermal load 02:20:18 28 diodes per PCB to ensure an evil even thermal load 02:20:20 4 A Yes. 02:20:26 5 In paragraph 35, I'm indicating agreeing with 02:20:32 5 In paragraph 35, I'm indicating agreeing with 02:20:32 5 In paragraph 35, I'm indicating agreeing with 02:20:20:32 6 what Mr. Kits was saying in his declaration of making 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to s	22 certainly one of the parameters that has to be taken 02:06:29	22 It's 2:20. 02:20:06
25 Q You say that use of larger PCB with numerous Page 46 1 laser diodes would necessitate a larger LiDAR housing; 2 is that right? 2 is that right? 2 is that right? 2 is that right? 3 A Well, yes, if you had larger boards, then the 2 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:45 5 comment on that because I haven't really designed the 2 02:07:05 6 housing, and maybe there's some innovative way to— 5 to—to deal with larger boards, but, generally 2 02:07:05 7 to—to deal with larger boards, but, generally 2 02:07:05 8 speaking, size would be an issue. 0 02:07:05 9 Q Is it fair, though, that if you had the same 0 02:07:08 10 number of lasers and you wanted to put them on smaller 10 boards, you would need more boards? 10 would need more boards? 11 Q All else being equal, is it fair to say that an 12 cight-by-eight arrangement of laser diodes would have a 12 cight-by-eight arrangement of laser diodes would have a 13 core wen thermal load than a 14 carrangement of laser diodes? 15 other extreme, you could have 64 boards with each having 16 one laser. 17 Q So when you add more boards, your size is going 18 to increase in some dimension; fair? 18 to increase in some dimension; fair? 20:207:36 18 to increase in some dimension; fair? 20:207:32 20 have a difficult alignment issue. Now you are aligning 20:207:42 21 have a difficult alignment issue. Now you are aligning 20:207:45 20 A Well, you have got — 20:207:57 21 A Same number of lasers and you wanded to put them on smaller 20:207:20 21 have a difficult alignment issue. Now you are aligning 20:207:36 21 have a difficult alignment issue. Now you are aligning 20:207:45 20 A Well, you have got — 20:207:57 21 A Same number of laser in the design is what I would term is 2 cight-by-eight arrangement of laser diodes? 2 cartal space — the space availability in these designs, 02:21:13 2 cyclosed in the LiDAR to position all the 2 cight have a difficult alignment: 2 cartal space — the space availability in these designs, 02:21:34 2 dand there's als	23 into account to design, let's call it, efficient LiDAR 02:06:31	23 BY MR. NEWTON: 02:20:08
1 laser diodes would necessitate a larger LiDAR housing; 02:06:40 2 is that right? 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:05 8 speaking, size would be an issue. 02:07:05 9 Q I sit fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:28 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:25 17 Q So when you add more boards, yous vize is going 02:07:35 18 to increase in some dimension; fair? 02:07:42 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:42 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 4 A Yes. 02:20:26 5 In paragraph 35, I'm indicating agreeing with 02:20:35 5 varie that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 Q Is it fair to say that all 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, iii is fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:06 14 arrangement of laser diodes? 02:21:06 15 other extreme, you could anore boards, you size is going 02:07:23 16 because I haven't looked at the engineering 02:21:13 17 pecifications for everything. 02:21:15 18 to increase in some dimension; fair? 02:07:48 20 boards. I'm not clear	24 systems. 02:06:37	24 Q Dr. Lebby, you also offered an opinion in 02:20:13
1 laser diodes would necessitate a larger LiDAR housing; 02:06:40 2 is that right? 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:45 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:25 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:38 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 23 alignment. 02:07:57 24 Q And there's also a physical alignment; correct? 02:07:57 25 make sure that the design is what I would term is 02:21:52 26 de boards as opposed to one board. That's optical 02:07:57 27 optically we have to take into account the size 02:21:34 28 alignment. 02:07:57 29 Q Is it fair, though, that if you have got 02:07:57 20 captally a proposed to one board. That's optical 02:07:42 29 boards. The not clear it's not clear it's not clear to me that 02:21:24 20 and there's also a physical alignment; correct? 02:07:54 20 Captally we have to take into account the size 02:21:34 21 alignment. 02:07:57 22 calculal space the space availability in these designs, 02:21:45 23 but what is really important is to make sure that you 02:21:45 24 can fit the boards in in a reasonable size.	25 Q You say that use of larger PCB with numerous 02:06:38	
2 is that right? 02:06:44 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair; though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's - hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:25 15 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 10 have a difficult alignment issue. Now you are aligning 02:07:45 21 A Well, you have got 02:07:57 22 A Well, you had larger boards, then the 02:06:44 4 A Yes. 02:20:26 6 what Mr. Kits was saying in his declaration of making 02:20:35 7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 A I don't know the edetailed answer to that question 02:21:107 13 more even thermal load 02:21:20 14 arrangement of laser diodes? 02:21:13 15 pecifications for everything. 02:21:13 16 because I haven't looked at the engineering 02:21:13 17 geoffications for everything. 02:21:13 18 Certainly we have to take into account the size 02:21:24 20 boards as opposed to one board. That's optical 02:07:45 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 actual space the space availability in these designs, 02:21:45 23 but what is really i	Page 46	Page 48
2 is that right? 02:06:44 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to - 02:06:58 7 to - to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair; though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's - hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:25 15 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your - if you have got 64 boards, yes, you 02:07:38 10 have a difficult alignment issue. Now you are aligning 02:07:45 12 A Well, you have got - 02:07:57 2 A Well, you have got - 02:07:57 2 diodes per PCB to ensure an evil even thermal load 02:20:24 4 A Yes. 02:20:26 6 what Mr. Kits was saying in his declaration of making 02:20:35 5 urne that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all - 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 A I don't know the detailed answer to that question 02:21:07 13 more even thermal load 02:21:07 14 arrangement of laser foodes would have a 02:21:13 15 pecifications for everything. 02:21:13 16 because I haven't looked at the engineering 02:21:13 17 geoffications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards as opposed to one board. That's optical 02:07:45 21 there may be space for eight boards.	1 laser diodes would necessitate a larger LiDAR housing: 02:06:40	1 have an equal or approximately equal number of laser 02:20:18
3 A Well, yes, if you had larger boards, then the 02:06:44 4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:15 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:45 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 the return of that is pound in a cross the PCBs; is that correct? 02:20:26 4 A Yes. 02:20:26 4 A Yes. O2:20:32 4 A Yes. O2:20:32 6 what Mr. Kits was saying in his declaration of making 02:20:35 7 sure that you have a equal or uniform thermal load. 02:20:43 9 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 cight-by-eight arrangement of laser diodes would have a 02:21:04 14 have 64 lasers on one board on one extreme. On the 02:07:23 15 A I don't know the detailed answer to that question 02:21:10 16 because I haven't looked at the engineering 02:21:15 18 to tier a visual part of		
4 housing most likely would have to be bigger, but I can't 02:06:48 5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:22 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:38 18 to increase in some dimension; fair? 02:07:38 10 may have a size issue, but you also have probably 02:07:42 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 23 alignment. 02:07:57 24 A Well, you have got 02:07:57 25 Mell, you have got 02:07:57 26 What Mr. Kits was saying in his declaration of making 02:20:35 26 what Mr. Kits was saying in his declaration of making 02:20:35 26 what Mr. Kits was saying in his declaration of making 02:20:49 26 What Mr. Kits was saying in his declaration of making 02:20:49 27 what Mr. Kits was saying in his declaration of making 02:20:49 28 Q Is it fair to say that all 02:20:43 29 (Discussion off the stenographic record.) 02:20:43 20 log: fair to say that all 02:20:43 21 delaber equal, is it fair to say that an 02:20:57 22 eight-by-eight arrangement of laser diodes would have a 02:20:59 21 delaber equal, is it fair to say that an 02:20:57 22 eight-by-eight arrangement of laser diodes would have a 02:20:59 23 la distributed with each having 02:07:25 24 A Yes. One death of was a equal or uniform thermal load. 02:20:40 25 A In paragraph 35, I'm indicating agreeing with 02:20:2	<u> </u>	•
5 comment on that because I haven't really designed the 02:06:56 6 housing, and maybe there's some innovative way to 02:06:58 7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:33 17 Q So when you add more boards, your size is going 02:07:38 18 to increase in some dimension; fair? 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 what Mr. Kits was saying in his declaration of making 02:20:35 26 what Mr. Kits was saying in his declaration of making 02:20:45 26 what Mr. Kits was saying in his declaration of making 02:20:45 26 what Mr. Kits was saying in his declaration of making 02:20:45 26 what Mr. Kits was saying in his declaration of making 02:20:45 27 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:59 12 eight-by-eight arrangement of laser diodes would have a 02:21:06 11 Q All else being equal, is it fair to say that an 02:20:59 12 eight-by-eight arrangement of laser diodes would have a 02:21:06 13 have 64 lasers on one board with each having 02:07:29 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to take into account the size 02:21:13 17 publications for eve		
6 housing, and maybe there's some innovative way to — 02:06:58 7 to — to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:15 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's — hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:36 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your — if you have got 64 boards, yes, you 02:07:48 20 may have a size issue, but you also have — probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got — 02:07:57 26 what Mr. Kits was saying in his declaration of making 02:20:45 7 sure that you have a equal or uniform thermal load. 02:20:49 02:07:08 9 Q Is it fair to say that all — 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes would have a 02:21:04 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:28 20 boards. I'm not clear — it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space — the space availability in these designs, 02:21:45 23 but what is really important is to make sure that you 02:21:45 24 can fit the boards in in a reasonable		5 In paragraph 35, I'm indicating agreeing with 02:20:32
7 to — to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's — hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your — if you have got 64 boards, yes, you 02:07:48 20 may have a size issue, but you also have — probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 23 alignment. 02:07:57 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got — 02:07:57 26 the fair, though, that if you had the same 02:07:08 8 Q Is it fair to say that all — 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:20:59 14 arrangement of laser diodes? 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear — it's not clear to me that 02:21:30 21:04 22 actual space — the space availability in these designs, 02:21:45 23 but what is really important is to make sure that you 02:21:45 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:20:40		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:45 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 A Mell, you have got 02:07:57 28 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:55 11 Q All else being equal, is it fair to say that all 02:20:43 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:42 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	to housing, and maybe there's some innovative way to 02:06:58	6 what Mr. Kits was saying in his declaration of making 02:20:35
9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:48 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 A Mell, you have got 02:07:57 29 (Discussion off the stenographic record.) 02:20:43 20 MR. NEWTON: I'll start over. 02:20:56 21 Q All else being equal, is it fair to say that an 02:20:57 21 Q All else being equal, is it fair to say that an 02:20:59 21 eight-by-eight arrangement of laser diodes would have a 02:20:59 21 arrangement of laser diodes would have a 02:20:59 22 eight-by-eight arrangement of laser diodes would have a 02:20:59 23 more even thermal load than a 02:21:04 24 arrangement of laser diodes would have a 02:20:59 25 A Well, you have got 64 boards, you could 02:07:24 26 (A boards as opposed to one board. That's optical 02:07:45 27 A Well, you have got 02:07:57 28 (Discussion off the stenographic record.) 30 MR. NEWTON: I'll start over. 02:02:55 31 MR. NEWTON: I'll start over. 02:02:55 31 MR. NEWTON: Til start over. 02:02:55 31 Q All else being equal, is it fair to say that an 02:20:59 32 (eight-by-eight arrangement of laser diodes would have a 02:20:59 31 more even thermal load than a 02:21:04 32 eight-by-eight arrangement of laser diodes would have a 02:21:05 31 more even thermal load than a 02:21:06 32 eight-by-eight arrangement of laser diodes would have a 02:20:59 31 more even thermal load than a 02:21:06 32 eight-by-eight arrangement		
10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:42 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 22 64 boards as opposed to one board. That's optical 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 10 MR. NEWTON: I'll start over. 02:02:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:13 16 because I haven't looked at the engineering 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:28 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 alignment. 02:07:57 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 David Have of the dead of th	7 to to deal with larger boards, but, generally 02:07:02	7 sure that you have a equal or uniform thermal load. 02:20:40
11 boards, you would need more boards? 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 17 Q So when you add more boards, your size is going 02:07:32 18 to increase in some dimension; fair? 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 19 have a difficult alignment issue. Now you are aligning 02:07:42 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 22 64 boards as opposed to one board. That's optical 02:07:54 24 Q And there's also a physical alignment; correct? 02:07:57 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:06 14 arrangement of laser diodes would have a 02:21:06 15 A I don't know the detailed answer to that question 02:21:17 16 because I haven't looked at the engineering 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:28 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43
12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 13 more even thermal load than a 02:21:04 26 4 arrangement of laser diodes would have a 02:20:59 27 13 more even thermal load than a 02:21:04 28 14 arrangement of laser diodes would have a 02:21:04 29 15 A I don't know the detailed answer to that question 02:21:15 20 Ecatainly we have to take into account the size 02:21:19 21 there may be space for eight boards. I don't know the 02:21:24 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:45 24 can fit the boards in in a reasonable size. You can 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43
13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:53 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 26 15 A I don't know the detailed answer to that question 02:21:06 26 15 A I don't know the detailed answer to that question 02:21:07 27 16 because I haven't looked at the engineering 02:21:13 28 Certainly we have to take into account the size 02:21:19 29 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:30 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:42 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56
14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:48 22 alignment. 02:07:53 23 lignment. 02:07:54 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 A I don't know the detailed answer to that question 02:21:07 26 A I don't know the detailed answer to that question 02:21:07 27	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57
15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 16 because I haven't looked at the engineering 02:21:13 17 Q So when you add more boards, your size is going 02:07:33 17 specifications for everything. 02:21:15 18 to increase in some dimension; fair? 02:07:36 18 Certainly we have to take into account the size 02:21:19 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 actual space the space availability in these designs, 02:21:34 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59
16 one laser. 02:07:32 16 because I haven't looked at the engineering 02:21:13 17 Q So when you add more boards, your size is going 02:07:33 17 specifications for everything. 02:21:15 18 to increase in some dimension; fair? 02:07:36 18 Certainly we have to take into account the size 02:21:19 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 19 that is being allowed in the LiDAR to position all the 02:21:24 20 may have a size issue, but you also have probably 02:07:42 20 boards. I'm not clear it's not clear to me that 02:21:28 21 have a difficult alignment issue. Now you are aligning 02:07:45 21 there may be space for eight boards. I don't know the 02:21:30 22 64 boards as opposed to one board. That's optical 02:07:48 22 actual space the space availability in these designs, 02:21:34 23 alignment. 02:07:53 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:55 25 M Well, you have got 02:07:57 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04
17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:57 25 A Well, you have got 02:07:57 26 17 specifications for everything. 02:21:15 26 18 Certainly we have to take into account the size 02:21:19 27 that is being allowed in the LiDAR to position all the 02:21:24 28 20 boards. I'm not clear it's not clear to me that 02:21:30 29 20 boards and in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:30 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:42 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06
18 to increase in some dimension; fair? O2:07:36 18 Certainly we have to take into account the size 02:21:19 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. O2:07:53 O2:07:54 D3 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:30 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:42 24 Q And there's also a physical alignment; correct? 02:07:54 25 M Well, you have got O2:07:57 D3:07:48 26 Certainly we have to take into account the size 02:21:19 18 Certainly we have to take into account the size 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space availability in these designs, 02:21:34 22 actual space the space availability in these designs, 02:21:42 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07
19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13
20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15
21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 there may be space for eight boards. I don't know the 02:21:30 26 actual space the space availability in these designs, 02:21:34 27 actual space the space availability in these designs, 02:21:34 28 but what is really important is to make sure that you 02:21:42 29 can fit the boards in in a reasonable size. You can 02:21:45 20 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19
22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54 25 A Well, you have got 02:07:57 26 actual space the space availability in these designs, 02:21:34 26 actual space the space availability in these designs, 02:21:34 27 actual space the space availability in these designs, 02:21:42 28 actual space the space availability in these designs, 02:21:42 29 can fit the boards in in a reasonable size. You can 02:21:45 20 actual space the space availability in these designs, 02:21:34 20 actual space the space availability in these designs, 02:21:34 21 actual space the space availability in these designs, 02:21:34 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:45 24 can fit the boards in in a reasonable size. You can 02:21:45 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:24 19 that is being allowed in the LiDAR to position all the 02:21:24
23 alignment. 02:07:53 23 but what is really important is to make sure that you 02:21:42 24 Q And there's also a physical alignment; correct? 02:07:54 24 can fit the boards in in a reasonable size. You can 02:21:45 25 A Well, you have got 02:07:57 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28
24 Q And there's also a physical alignment; correct? 02:07:54 24 can fit the boards in in a reasonable size. You can 02:21:45 25 A Well, you have got 02:07:57 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:30
25 A Well, you have got 02:07:57 25 make sure that the design is what I would term is 02:21:52	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34
	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space the space availability in these designs, 02:21:34 23 but what is really important is to make sure that you 02:21:42
	7 to to deal with larger boards, but, generally 02:07:02 8 speaking, size would be an issue. 02:07:05 9 Q Is it fair, though, that if you had the same 02:07:08 10 number of lasers and you wanted to put them on smaller 02:07:12 11 boards, you would need more boards? 02:07:15 12 A Same number of lasers on smaller boards need more 02:07:18 13 boards. So, yeah, that's hypothetically, you could 02:07:23 14 have 64 lasers on one board on one extreme. On the 02:07:26 15 other extreme, you could have 64 boards with each having 02:07:29 16 one laser. 02:07:32 17 Q So when you add more boards, your size is going 02:07:33 18 to increase in some dimension; fair? 02:07:36 19 A Yeah, your if you have got 64 boards, yes, you 02:07:38 20 may have a size issue, but you also have probably 02:07:42 21 have a difficult alignment issue. Now you are aligning 02:07:45 22 64 boards as opposed to one board. That's optical 02:07:48 23 alignment. 02:07:53 24 Q And there's also a physical alignment; correct? 02:07:54	7 sure that you have a equal or uniform thermal load. 02:20:40 8 Q Is it fair to say that all — 02:20:43 9 (Discussion off the stenographic record.) 02:20:43 10 MR. NEWTON: I'll start over. 02:20:56 11 Q All else being equal, is it fair to say that an 02:20:57 12 eight-by-eight arrangement of laser diodes would have a 02:20:59 13 more even thermal load than a 02:21:04 14 arrangement of laser diodes? 02:21:06 15 A I don't know the detailed answer to that question 02:21:07 16 because I haven't looked at the engineering 02:21:13 17 specifications for everything. 02:21:15 18 Certainly we have to take into account the size 02:21:19 19 that is being allowed in the LiDAR to position all the 02:21:24 20 boards. I'm not clear — it's not clear to me that 02:21:28 21 there may be space for eight boards. I don't know the 02:21:30 22 actual space — the space availability in these designs, 02:21:42 24 can fit the boards in in a reasonable size. You can 02:21:45

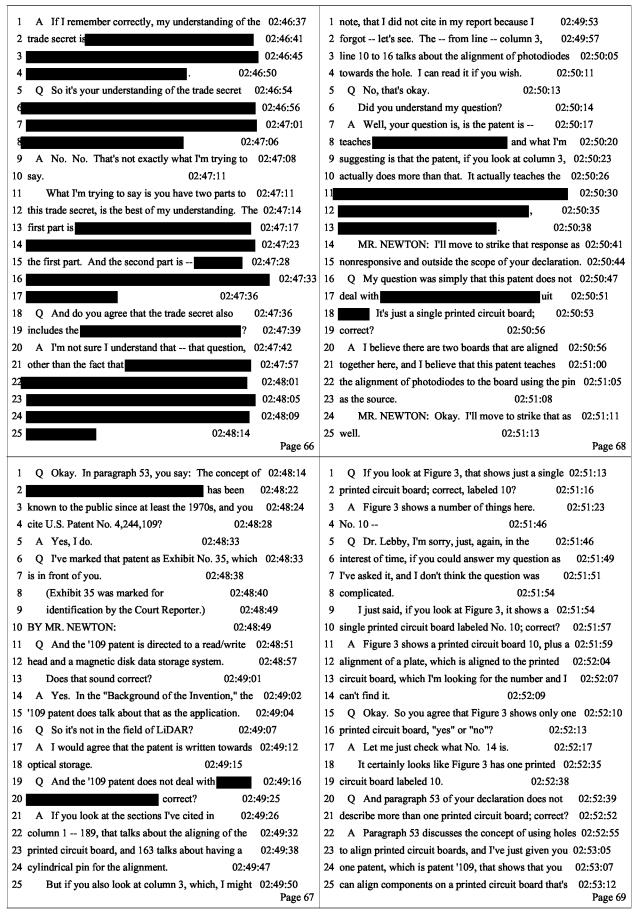
Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 6 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 scalable, which means you can scale it in cost, so you 02:21:55	1 applications. It just talks about the technology that 02:24:19
2 don't actually increase the cost, but you can reduce the 02:21:59	2 is used in terms of packaging semiconductor lasers. 02:24:24
3 cost. You can maintain alignment, for example, and 02:22:01	3 Q And you I'm looking at paragraph 37 of your 02:24:27
4 that's making sure you have a thermal load. 02:22:04	4 declaration, which you might want to follow along with. 02:24:33
5 So whether that's eight or six or seven and a 02:22:07	5 You specifically cite Figure 5.5 of the Liu 02:24:37
6 half or five and a half, I don't know that answer, but I 02:22:10	6 textbook; correct? 02:24:44
7 think it's important to take into account that you want 02:22:13	7 A Yes, I have cited that figure. 02:24:45
8 to try and minimize your thermal load issues and your 02:22:15	8 Q Okay. And this shows a semiconductor laser stack 02:24:47
9 size issues when you come to your design. 02:22:20	9 that is composed of multisemiconductor laser bars 02:24:51
10 Q Okay. I'll just ask you, since we are on a clock 02:22:22	10 arranged vertically? 02:24:54
11 here and we have a limited amount of time, if you could 02:22:29	11 A That is correct; although, I would note, on 02:24:58
12 try to answer my questions specifically. If you can't, 02:22:32	12 line 22 of page 9, I do not call out a laser stack of 02:25:02
13 of course, I understand. 02:22:34	13 bars, but I use the word three "boards," but I believe 02:25:07
But just so we are clear, my question was: All 02:22:35	14 that you are probably more correct. 02:25:12
15 else being equal, an eight-by-eight arrangement of laser 02:22:38	15 Q Okay. "Boards" was your term, not the term from 02:25:14
16 diodes would have a more even thermal diode than a 02:22:41	16 the Liu textbook? 02:25:17
17 arrangement, and with the 02:22:45	17 A "Board" was my term. 02:25:19
18 information, you can't give a "yes" or "no" answer to 02:22:49	18 Q Okay. And laser bars, am I correct that they are 02:25:21
19 that; is that fair? 02:22:52	19 strips of multiple emitters on a common heat sink that 02:25:26
20 A I can't give an answer because I don't have the 02:22:53	20 are all packaged together? 02:25:31
21 details. 02:22:57	21 A Yeah. Laser bar is is a single piece of 02:25:32
When you say "everything being equal," I don't 02:22:59	22 semiconductor. 02:25:35
23 know what "everything" is, so I can't really give you a 02:23:01	23 In this case, the laser bars are showing ten 02:25:36
24 categorical answer there. 02:23:05	24 ten emitters, and it would probably have ten stripes, 02:25:40
25 // 02:23:05	25 and they are not singulated, so they are not individual 02:25:43
Page 50	Page 52
1 (Exhibit 33 was marked for 02:23:05	1 lasers. 02:25:46
	2 Q And the LiDAR systems that we have talked about 02:25:47
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05	2 Q And the LiDAR systems that we have talked about 02:25:47 3 in this case use singulated emitters; correct? 02:25:50
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06	 Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15	 Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18	2 Q And the LiDAR systems that we have talked about 02:25:47 3 in this case use singulated emitters; correct? 02:25:50 4 A Yes. They use singulated emitters. 02:25:55 5 I think I saw, in one of the documents, that the 02:26:00 6 emitter is composed of laser-emitting chips. I 02:26:05
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22	2 Q And the LiDAR systems that we have talked about 02:25:47 3 in this case use singulated emitters; correct? 02:25:50 4 A Yes. They use singulated emitters. 02:25:55 5 I think I saw, in one of the documents, that the 02:26:00 6 emitter is composed of laser-emitting chips. I 02:26:05 7 haven't seen, in detail, what they look like, but this 02:26:11 8 example here just shows you that you could have a laser 02:26:14
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26	2 Q And the LiDAR systems that we have talked about 02:25:47 3 in this case use singulated emitters; correct? 02:25:50 4 A Yes. They use singulated emitters. 02:25:55 5 I think I saw, in one of the documents, that the 02:26:00 6 emitter is composed of laser-emitting chips. I 02:26:05 7 haven't seen, in detail, what they look like, but this 02:26:11 8 example here just shows you that you could have a laser 02:26:14 9 bar with ten laser diode outputs. 02:26:17 10 Q You agree with me that Figure 5 is is it fair 02:26:20
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 zero C2:26:41
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31	2 Q And the LiDAR systems that we have talked about 02:25:47 3 in this case use singulated emitters; correct? 02:25:50 4 A Yes. They use singulated emitters. 02:25:55 5 I think I saw, in one of the documents, that the 02:26:00 6 emitter is composed of laser-emitting chips. I 02:26:05 7 haven't seen, in detail, what they look like, but this 02:26:11 8 example here just shows you that you could have a laser 02:26:14 9 bar with ten laser diode outputs. 02:26:17 10 Q You agree with me that Figure 5 is is it fair 02:26:20 11 to say it's kind of a crude representation of the laser 02:26:38 12 stack laser bar stack? 02:26:41 13 A When you say "crude," yeah, there's not a lot of 02:26:42
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 J think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:53	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:59
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:56	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 mitted laser beam from each of the output emitters. 02:26:59 And do you agree that the number of emitters on a 02:27:03
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:56 19 connections to the outside world. 02:23:59	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 emitted laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 mentited laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:53 18 Packaging usually allows both optical and electrical 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01 21 LiDAR; is that correct? 02:24:03	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 mentited laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12 19 to 69. I'm not sure I understand the question. 02:27:24
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01 21 LiDAR; is that correct? 02:24:04	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 meitted laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12 19 to 69. I'm not sure I understand the question. 02:27:24 Q So a laser bar typically has a number of laser 02:27:27
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:53 18 Packaging usually allows both optical and electrical 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01 21 LiDAR; is that correct? 02:24:03 22 A That is correct. 02:24:04 23 Q And the textbook does not describe any specific 02:24:05	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 meitted laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12 19 to 69. I'm not sure I understand the question. 02:27:24 Q So a laser bar typically has a number of laser 02:27:27 emitters on it; correct? 02:27:32
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:53 18 Packaging usually allows both optical and electrical 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01 21 LiDAR; is that correct? 02:24:03 22 A That is correct. 02:24:04 23 Q And the textbook does not describe any specific 02:24:05 24 LiDAR applications; is that correct? 02:24:11	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 meitted laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12 19 to 69. I'm not sure I understand the question. 02:27:24 Q So a laser bar typically has a number of laser 02:27:27 emitters on it; correct? 02:27:34
2 identification by the Court Reporter.) 02:23:05 3 BY MR. NEWTON: 02:23:05 4 Q Okay. I've handed you Exhibit No. 33, and this 02:23:06 5 was Exhibit 4 to your declaration. It's a textbook 02:23:15 6 authored by Xingsheng Liu; is that correct? 02:23:18 7 And I should mention this is an excerpt from the 02:23:22 8 textbook. 02:23:25 9 A Yes, it is. 02:23:25 10 Q The title of the textbook is "Packaging of High 02:23:26 11 Power Semiconductor Lasers"? 02:23:29 12 A That is correct. 02:23:30 13 Q What does "packaging" refer to in that title? 02:23:31 14 A "Packaging" is usually the process of making 02:23:38 15 outside connections to a semiconductor chip. It doesn't 02:23:43 16 have to be a semiconductor chip, but it's usually 02:23:51 17 something that emits or detects light in this case. 02:23:53 18 Packaging usually allows both optical and electrical 02:23:56 19 connections to the outside world. 02:23:59 20 Q Okay. And this textbook is not specific to 02:24:01 21 LiDAR; is that correct? 02:24:03 22 A That is correct. 02:24:04 23 Q And the textbook does not describe any specific 02:24:05	Q And the LiDAR systems that we have talked about 02:25:47 in this case use singulated emitters; correct? 02:25:50 A Yes. They use singulated emitters. 02:25:55 I think I saw, in one of the documents, that the 02:26:00 emitter is composed of laser-emitting chips. I 02:26:05 haven't seen, in detail, what they look like, but this 02:26:11 example here just shows you that you could have a laser 02:26:14 bar with ten laser diode outputs. 02:26:17 Q You agree with me that Figure 5 is is it fair 02:26:20 to say it's kind of a crude representation of the laser 02:26:38 stack laser bar stack? 02:26:41 A When you say "crude," yeah, there's not a lot of 02:26:42 details in Figure 5.5. It just shows three substrates 02:26:48 mounted on top of each other with laser bars mounted on 02:26:52 the substrate and the what would look like the 02:26:55 meintted laser beam from each of the output emitters. 02:26:59 Q And do you agree that the number of emitters on a 02:27:03 semiconductor laser bar range from 19 to 69, typically? 02:27:06 A The number of emitters on a laser bar range from 02:27:12 19 to 69. I'm not sure I understand the question. 02:27:24 Q So a laser bar typically has a number of laser 02:27:27 emitters on it; correct? 02:27:32

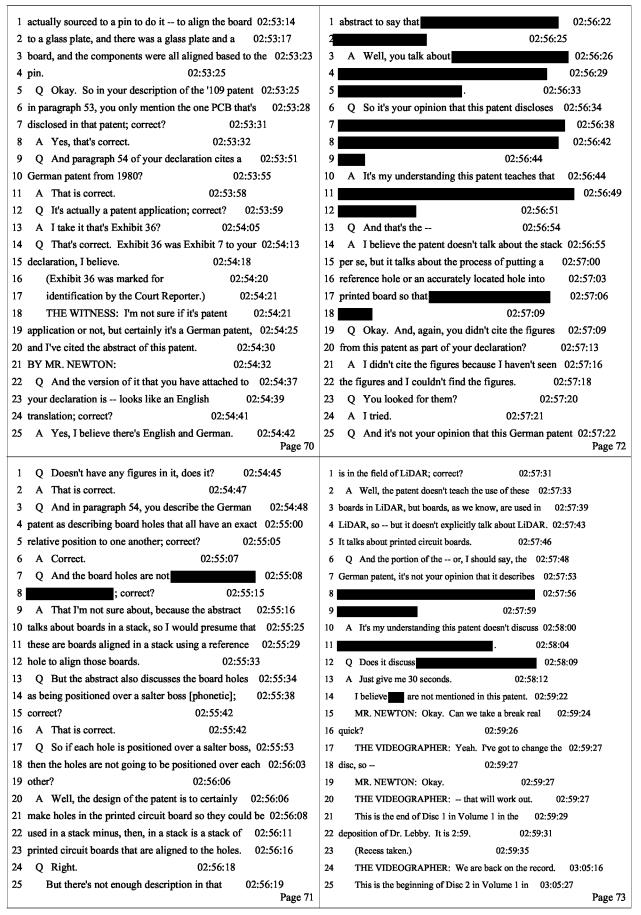
Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 7 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

2 A I see that. 3 Q Am I correct that you do not dispute that the 02:34:13 4 Poil device includes a transmit block with a plurality 02:34:18 5 of laser diodes mounted on vite of 1 and	1 02:34:10	1 A Oh, Figure 7.51 [sic]? 02:37:28
3 A Yes, Pve got that in front of me. 0.2347.31 4 Fuji device includes at tansmit block with a plurality 0.234.21 5 A That is correct. 0.237.33 0.237.33 0.237.33 7 3 A Yes, Pve got that in front of me. 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.33 0.237.34 0.237.33 0.237.34		
A Fuji device includes a transmit block with a plurality 0.234.18 C And Liu also includes a Figure 7.5.07 0.237.37		
5 of laser diodes mounted on		
6 Q. And that's not cited in your declaration? 0.237:37 7 A. So I have heard this from Mr. Haslim in my 0.234:27 8 video-call discussion with him, because I asked him the 0.234:37 9 question, though I have not actually seen a board or a 0.234:39 10 laser package in - in real life, only from a 0.234:39 11 photograph, which I've used in my document, and the 0.234:59 12 resolution of which is - doesn't allow me to take a 0.234:50 13 close look at the situation. 0.234:51 14 Q. So you did not offer an opinion as to whether 0.234:51 15 this design is present or not in the Fluif device? 0.234:51 15 this design is present or not in the Fluif device? 0.234:51 17 in the Fluij system are		_
8 video-all discussion with him, because I saked him the 02:34:30 8 video-all discussion with him, because I saked him the 02:34:37 9 question, hough I have not actually seen a board or 8 02:34:39 10 laser package in − in real life, only from a 02:34:42 11 photograph, which I've used in my document, and the 02:34:47 12 resolution of which is − dosen't allow mote take a 02:34:53 13 close look at the situation. 02:34:53 14 Q So you did not offer an opinion as to whether 02:34:53 15 this design is present or not in the Fuji device' 02:34:58 16 A It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:02 18 Mr. Haslim. 02:35:12 19 Q Did he tell you		
8 video-call discussion with him, because I asked him the 02:34:379 9 question, though I have not actually seen a board or a 02:34:379 10 laser package in — in real life, only from a 02:34:429 11 photograph, which I've used in my document, and the 02:34:47 11 prosolution of which is — doesn't allow me to take a 02:34:57 12 resolution of which is — doesn't allow me to take a 02:34:57 14 Q So you did not offer an opinion as to whether 02:34:54 15 this design is present or not in the Fuji device? 02:34:53 16 A It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:08 18 Mr. Haslim. 02:35:12 19 Q Did he tell you 70:235:12 20 A I believe he may have said 10:235:04 21 can't be quoted on that because that number did come 02:35:22 22 up, and I vasm't sure if it related by 10:235:24 23 Q Is it correct that the only LiDAR devices with 02:35:37 24 Q Is it correct that the only LiDAR devices with 02:35:37 25 metal are identified in your 02:35:37 26 A Well, I haven't done a industrial review of LiDAR 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devicer so what I can say is that, from the documents 02:35:52 5 Ner read, the Waymo device uses		·
9 A Yeak, I think I just cited the Liu textbook 02:37:49 10 laser package in – in real life, only from a 02:34:42 11 photograph, which Ye used in the 02:34:45 12 resolution of which is – doesn't allow me to take a 02:34:53 13 close look at the situation. 02:34:53 13 close look at the situation. 02:34:53 14 Q S oyo udit din ctoffer an opinion as to whether 02:34:54 15 this design is present or not in the Puji device? 02:34:58 16 A It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:02 18 Mr. Haslim. 02:35:12 19 Q Did he tell you 02:35:12 19 Q Did he tell you 02:35:12 21 Lean't be quoted on that because that number did come 02:35:22 22 up, and I wasn't sure if it related to 02:35:23 23 up, and I wasn't sure if it related to 02:35:33 24 Q Is it correct that the only LiDAR devices with 02:35:33 25 up and I wasn't sure if it related to 02:35:44 26 devices, so what I can say is that, from the documents 02:35:45 27 haven't actually scen the board in detail — that Fuji 02:36:69 28 devices also uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 29 other laser - LiDAR unit uses did diodes. I don't know if any 02:36:69 20 other laser - LiDAR unit uses did diodes. I do	_	
10 laser package in — in real life, only from a 02:34:42 11 photograph, which I've used in my document, and the 02:34:47 11 Q. You don't discuss Figure 7.5.0 in your 02:37:54 12 resolution of which is — doesn't allow mote take 02:34:53 12 declaration? 02:37:57 13 close look at the situation. 02:34:53 14 Q. So you did not offer an opinion as to whether 02:34:53 15 this design is present or not in the Fuji device? 02:34:58 16 A. It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:12 18 Mr. Hallin. 02:35:12 19 Q. Did he tell you 7 02:35:12 19 Q. Did he tell you 7 02:35:12 19 Q. Did he tell you 7 02:35:12 12 Larn't be quited on that because that number did come 02:35:26 19 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:28 19 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:28 19 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:33 10 02:35:37 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38 10 Q. So my question, Dr. Lebby, was just: 1s it in 02:38:38	-	9 A Yeah, I think I just cited the Liu textbook 02:37:49
12 resolution of which is — doesn't allow me to take a 02:34:59 13 close look at the situation. 02:34:53 14 C S org out did not offer an opinion as to whether 02:34:58 15 this design is present or not in the Fuji device? 02:34:58 16 A. It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:02 18 Mr. Hastim. 02:35:12 19 Q Did he tell you 7 02:35:12 19 Q S ony question, Dr. Lobby, was just: Is it in 02:38:28 20 20 20 20 20 20 20		10 page 224. 02:37:53
12 resolution of which is — doesn't allow me to take a 02:34:59 13 close look at the situation. 02:34:53 14 C S org out did not offer an opinion as to whether 02:34:58 15 this design is present or not in the Fuji device? 02:34:58 16 A. It's my understanding that the laser diodes used 02:35:02 17 in the Fuji system are from my discussion with 02:35:02 18 Mr. Hastim. 02:35:12 19 Q Did he tell you 7 02:35:12 19 Q S ony question, Dr. Lobby, was just: Is it in 02:38:28 20 20 20 20 20 20 20		
14	12 resolution of which is doesn't allow me to take a 02:34:50	12 declaration? 02:37:57
15 this design is present or not in the Fuji device? 16 A 1's my understanding that the laser diodes used 17 in the Fuji system are from my discussion with 02:35:02 18 Mr. Haslim. 19 Q Did he tell you 20 A 1 believe he may have said 30 Li can't be quoted on that because that number did come 20:35:22 21 up, and I wasn't sure if it related to 22:35:26 22 up, and I wasn't sure if it related to 23:35:27 23 Up, and I wasn't sure if it related to 23:35:27 24 Q Is it correct that the only LiDAR devices with 02:35:04 25 Up, and I wasn't sure if it related to 26:35:27 1 declaration are Waymo's devices and the Uber Fuji 26 device? 1 device; so what I can say is that, from the documents 27 A Well, I haven't done a industrial review of LiDAR 02:35:54 28 device also uses diodes. I don't know if any 02:36:03 29 haven't actually seen the board in detail—that Fuji 02:36:04 3 haven't actually seen the board in detail—that Fuji 02:36:05 4 device also uses diodes. I don't know if any 02:36:03 7 haven't actually seen the board in detail—that Fuji 02:36:04 10 point. 20 So you didn't identify any others besides the 10 Q:36:28 12 Q So you didn't identify any others besides the 02:36:27 13 A I didn't identify any others besides the 10 Q:36:37 24 Q Fargaraph 49 of your declaration, you cite the 02:36:27 25 Q Pargaraph 49 of your declaration, you cite the 02:36:28 26 Q Ray, And I believe you cite page 224 of the Liu 02:36:18 27 Q And your declaration at parsgraph 49 includes 02:36:27 28 Q Oxy, And I believe you cite page 224 of the Liu 02:36:24 29 Q No mage revided, so I would agree, 02:38:55 20 Q Pargaraph 49 of your declaration, you cite the 02:36:28 20 Q And dhen the context of this board in detail—that Fuji 02:36:28 21 Q And your declaration at parsgraph 49 includes 02:36:27 22 Q So page 224 of the Liu textbook again; is that correct? 02:36:27 23 A Ceully naven that the fount of me. 02:36:28 24 Q I and then the context of this board in detail—that Fuji 02:36:22 25 Device a search of the spec	13 close look at the situation. 02:34:53	13 A That is correct. 02:37:57
16	14 Q So you did not offer an opinion as to whether 02:34:54	14 Q And figure page 224 of the Liu textbook, along 02:38:01
17 in the Fuji system are	15 this design is present or not in the Fuji device? 02:34:58	15 with Figure 7.5.0 and 7.5.1, this material is not in the 02:38:13
18 Mr. Haslim.	16 A It's my understanding that the laser diodes used 02:35:02	16 context of LiDAR; correct? 02:38:19
19	17 in the Fuji system are from my discussion with 02:35:08	17 A Well, what we are looking at here is the 02:38:20
20 A I believe he may have said but 02:35:14 21 I can't be quoted on that because that number did come 02:35:22 22 up, and I wasn't sure if it related treatments of 02:35:26 23 up, and I wasn't sure if it related treatments of 02:35:26 24 Q Is it correct that the only LiDAR devices with 02:35:33 25 that are identified in your 02:35:37 Page 58 1 declaration are Waymo's devices and the Uber Fuji 02:35:37 Page 58 1 declaration are Waymo's devices and the Uber Fuji 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 Tye read, the Waymo device uses and in detail	18 Mr. Haslim. 02:35:12	18 placement of laser diodes. 02:38:26
21 I can't be quoted on that because that number did come 02:35:22 22 up, and I wasn't sure if it related to 02:35:26 23 24 Q Is it correct that the only LiDAR devices with 02:35:33 25 26 27 28 29 29 20	19 Q Did he tell you ? 02:35:12	19 Q So my question, Dr. Lebby, was just: Is it in 02:38:28
22 up, and I wasn't sure if it related to 02:35:26 23	20 A I believe he may have said , but 02:35:14	20 the context of LiDAR specifically? 02:38:31
23 high-power laser diodes, so I would agree with you that 02:38:41 24 Q Is it correct that the only LiDAR devices with 02:35:33 25 that are identified in your 02:35:37 26 Page 58 1 declaration are Waymo's devices and the Uber Fuji 02:35:40 2 device? 02:35:44 2 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses 1, and on 02:35:57 5 I've read, the Waymo device uses 1, and on 02:36:06 6 the Fuji device, from what I've been told and I 02:36:06 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses 1 doides. I don't know if any 02:36:09 9 other laser LiDAR unit uses 1 at this 02:36:18 10 Q So you didn't identify any others besides the 02:36:18 11 Q So you didn't identify any others besides the 02:36:21 13 A I didn't identify any others besides the 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:37 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:02 23 A Could you tell me where you get 7.5.1? 02:37:22 24 LiDAR is not noted in the book, but I have to observe 02:38:46 25 that LiDAR uses high-power laser diodes, so I would agree with pour taker diodes, so I would agree with pour declaration? 02:38:54 2 LiDAR is not noted in the book, but I have to observe 02:38:54 2 LiDAR uses high-power laser diodes in a similar 02:38:54 2 Q S o page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:00 4 A Well, it's – it's discussing – it's discussing 02:39:00 5 the beat pair is discussing 02:39:00 5 the beat at LiDAR uses high-power laser diodes, so I would agree with fue Liu textbook, you would agree, 02:38:55 4 LiDAR uses high-power laser diodes in a similar 02:38:55 5 the beat LiDAR uses high-power laser diodes in a similar 02:38:55 5 the beat LiDAR uses high-power laser diodes i	21 I can't be quoted on that because that number did come 02:35:22	21 A Well, this is in the context of packaging laser 02:38:33
24 Q Is it correct that the only LiDAR devices with that are identified in your brage 58 25 that are identified in your Page 58 26 that LiDAR uses high-power laser diodes in a similar O2:38:50 Page 60 27 device? 02:35:44 28 devices, so what I can say is that, from the documents 02:35:52 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and no 02:35:57 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:03 8 device also uses diodes. I don't know if any 02:36:09 9 other laser - LiDAR unit uses at this 02:36:18 10 Q So page 224 of the Liu textbook, you would agree, 02:38:55 5 the packaging of high-power semiconductor lasers are 02:39:09 5 the packaging of high-power semiconductor lasers are 02:39:09 6 tused in LiDAR, but it does not, agree with you, call out 02:39:17 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:37 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 10 Q Nay. And I believe you cite page 224 of the Liu 02:36:58 11 Q And your declaration at paragraph 49 includes 02:37:09 21 Figure 7.5.1 from Liu; correct? 02:37:09 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 LiDAR uses high-power laser diodes in a similar 02:38:50 Page 60 1 declaration are Waymo's devices and the Uber Fuji 02:35:40 2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 5 the packaging of high-power semiconductor lasers are 02:39:09 5 the packaging of high-power semiconductor lasers are 02:39:09 10 A This book — the context of this book is — is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 0	22 up, and I wasn't sure if it related to 02:35:26	22 diodes in high-power environment, and LiDAR uses 02:38:37
that are identified in your 02:35:37 Page 58 1 declaration are Waymo's devices and the Uber Fuji 02:35:40 2 device? 02:35:44 2 devices, oo what I can say is that, from the documents 02:35:54 4 devices, so what I can say is that, from the documents 02:35:55 5 I've read, the Waymo device uses and the Uber Fuji 02:35:57 6 the Fuji device, from what I've been told — and I 02:36:03 7 haven't actually seen the board in detail — that Fuji 02:36:04 8 device also uses device also device also uses device also uses device also uses devic	23 . 02:35:30	23 high-power laser diodes, so I would agree with you that 02:38:41
Page 58	24 Q Is it correct that the only LiDAR devices with 02:35:33	24 LiDAR is not noted in the book, but I have to observe 02:38:46
1 declaration are Waymo's devices and the Uber Fuji		
2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses	Page 58	Page 60
3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:57 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses device also device also uses device		
4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses 1, and on 02:35:57 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses 1 diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses 1 at this 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:57 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:25 24 Q You might have to cross-reference it with the 02:37:25 25 the Packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And J believe you say that a known disadvantage 02:39:31 15 of 1 mentioned. 02:39:30 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And your declaration at paragraph 49 includes 02:37:00 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 21 Q And you declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:22 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 26 blockage of emitted light? 02:40:00	1 declaration are Waymo's devices and the Uber Fuji 02:35:40	1 fashion. 02:38:54
5 I've read, the Waymo device uses	2 device? 02:35:44	2 Q So page 224 of the Liu textbook, you would agree, 02:38:55
6 the Fuji device, from what I've been told and I	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44	 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02
7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:38 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:22 25 the Liu text itself. 02:37:25 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of sis an effective heat 02:39:36 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:56 21 A I would go further to say that heat conduction is 02:39:56 22 important for all semiconductor diode lasers. 02:39:56 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00 25 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52	 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05
8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:37 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:09 22 Figure 7.5.1 from Liu; correct? 02:37:29 23 A Could you tell me where you get 7.5.1? 02:37:12 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 8 Q It doesn't say use these designs in a LiDAR 02:39:17 A This book the context of this book is is 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:24 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of the packaging of the lasers, not the applications, so I 02:39:24 15 of the packaging of the lasers, not the applications, so I 02:39:24 16 Liu textbook again; is that correct? 02:39:36 17 A That is correct? 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:50 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:56 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses , and on 02:35:5	 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 5 the packaging of high-power semiconductor lasers are 02:39:09
9 other laser LiDAR unit uses	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses , and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03	 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12
10 point. 10 point. 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 15 Q Paragraph 49 of your declaration, you cite the 02:36:37 16 Liu textbook again; is that correct? 17 A Yes. 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:48 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:30:24 26 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17
11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 10 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:02 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:25 25 the Liu text itself. 02:37:25 26 Usymo and Fuji device in your declaration? 02:36:21 26 Waymo and Fuji device in your declaration? 02:36:21 27 Waymo and Fuji device in your declaration? 02:36:21 28 Waymo and Fuji device in your declaration? 02:36:22 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of the lasers, not the applications, so I 02:39:24 16 conduction; correct? 02:39:31 17 A That is correct? 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:48 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:56 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 25 blockage of emitted light? 02:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and no 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09	2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17
12 Waymo and Fuji device in your declaration? 12 would agree with you that LiDAR is not called out or 13 A I didn't identify any others because I haven't 14 done analysis. 15 Q Paragraph 49 of your declaration, you cite the 16 Liu textbook again; is that correct? 17 A Yes. 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 10 A Yes, I have it in front of me. 10 Q:36:58 20 A Yes, I have it in front of me. 20 And your declaration at paragraph 49 includes 20 A Could you tell me where you get 7.5.1? 21 Q You might have to cross-reference it with the 22 O2:37:25 23 C You might have to cross-reference it with the 23 O2:37:25 24 Q You might have to cross-reference it with the 25 O2:36:27 26 Q 2:36:28 27 Q And you dagree with you that LiDAR is not called out or 20:39:28 28 Q And I believe you say that a known disadvantage 20 Q:39:30 21 Q And I believe you say that a known disadvantage 20 Q:39:31 21 Q And J believe you say that a known disadvantage 20 Q:39:31 21 Q And J believe you say that a known disadvantage 20 Q:39:31 21 Q And J believe you say that a known disadvantage 20 Q:39:31 21 Q And J believe you say that a known disadvantage 20 Q:39:31 21 Q And J believe you say that a known disadvantage 20 Q:39:36 21 Q And you agree with me that heat conduction and 20:39:42 21 Q And you agree with me that heat conduction and 20:39:42 22 D high-powered laser diode applications? 23 Q And then the I believe you also said the 24 downside of underhanging laser diodes is potential 25 blockage of emitted light? 26 D2:39:50 27 D2:39:40 28 Q:39:30 29 And then the I believe you also said the 29:40:00 29:40:00 29:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13	2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20
13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:25 25 blockage of emitted light? 02:40:00 25 the Liu text itself. 02:37:25 26 And I believe you say that a known disadvantage 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18	2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20
14 done analysis. 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 17 A Yes. 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 10 A Yes, I have it in front of me. 11 Q And J believe you say that a known disadvantage 02:39:31 12 Q And your declaration, you cite the 02:36:37 13 A Could you tell me where you get 7.5.1? 19 Other thermal considerations are important for 02:39:48 20 A J would go further to say that heat conduction is 02:39:50 21 A I would go further to say that heat conduction is 02:39:50 22 Figure 7.5.1 from Liu; correct? 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 20 And I believe you say that a known disadvantage 02:39:31 16 Conduction; correct? 17 A That is correct. 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:48 20 high-powered laser diode applications? 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 20 Other thermal considerations are important for 02:39:42 22 important for all semiconductor diode lasers. 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24
15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 26 Conduction; correct? 02:39:41 27 A That is correct. 02:39:41 28 Q And you agree with me that heat conduction and 02:39:46 29 Other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:50 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:56 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 26 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21	2 Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28
16 Liu textbook again; is that correct? 02:36:37 16 conduction; correct? 02:39:41 17 A Yes. 02:39:41 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 20 high-powered laser diode applications? 02:39:48 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:39:41 16 conduction; correct? 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:48 20 high-powered laser diode applications? 02:39:48 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:48 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 25 blockage of emitted light? 02:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30
17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 26 A That is correct. 02:39:41 27 A That is correct. 02:39:41 28 Q And you agree with me that heat conduction and 02:39:42 29 Liphopowered laser diode applications? 02:39:48 20 high-powered laser diode applications? 02:39:50 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:56 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 25 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24 would agree with you that LiDAR is not called out or 02:39:28 mentioned. 02:39:30 A And I believe you say that a known disadvantage 02:39:31
18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:48 20 A Yes, I have it in front of me. 02:36:58 20 high-powered laser diode applications? 02:39:48 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:48 20 high-powered laser diode applications? 02:39:48 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:54 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 25 blockage of emitted light? 02:40:00	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24 would agree with you that LiDAR is not called out or 02:39:38 mentioned. 02:39:30 A And I believe you say that a known disadvantage 02:39:31 is an effective heat 02:39:36
19 textbook? 02:36:57 19 other thermal considerations are important for 02:39:46 20 A Yes, I have it in front of me. 02:36:58 20 high-powered laser diode applications? 02:39:48 21 Q And your declaration at paragraph 49 includes 02:37:00 21 A I would go further to say that heat conduction is 02:39:50 22 Figure 7.5.1 from Liu; correct? 02:37:09 22 important for all semiconductor diode lasers. 02:39:54 23 A Could you tell me where you get 7.5.1? 02:37:12 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 25 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:5 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24 would agree with you that LiDAR is not called out or 02:39:28 mentioned. 02:39:30 Q And I believe you say that a known disadvantage 02:39:31 of the packaging of the lasers is an effective heat 02:39:36 conduction; correct? 02:39:41
20 A Yes, I have it in front of me. 02:36:58 21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 20 high-powered laser diode applications? 02:39:48 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:54 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 26 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of is an effective heat 02:39:36 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41
21 Q And your declaration at paragraph 49 includes 02:37:00 22 Figure 7.5.1 from Liu; correct? 02:37:09 23 A Could you tell me where you get 7.5.1? 02:37:12 24 Q You might have to cross-reference it with the 02:37:22 25 the Liu text itself. 02:37:25 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:54 23 Q And then the I believe you also said the 02:39:56 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 26 Dockage of emitted light? 02:40:03	2 device? O2:35:44 A Well, I haven't done a industrial review of LiDAR 02:35:44 devices, so what I can say is that, from the documents 02:35:52 F've read, the Waymo device uses and on 02:35:55 the Fuji device, from what I've been told and I 02:36:03 haven't actually seen the board in detail that Fuji 02:36:06 device also uses diodes. I don't know if any 02:36:09 other laser LiDAR unit uses at this 02:36:13 Doint. O2:36:18 Q So you didn't identify any others besides the 02:36:18 Waymo and Fuji device in your declaration? O2:36:21 A I didn't identify any others because I haven't 02:36:22 done analysis. O2:36:27 Q Paragraph 49 of your declaration, you cite the 02:36:28 Liu textbook again; is that correct? O2:36:37 A Yes. O2:36:39	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24 would agree with you that LiDAR is not called out or 02:39:28 mentioned. 02:39:30 Q And I believe you say that a known disadvantage 02:39:31 of is an effective heat 02:39:36 conduction; correct? 02:39:41 A That is correct. 02:39:41 A That is correct. 02:39:41
22 Figure 7.5.1 from Liu; correct? 02:37:09 22 important for all semiconductor diode lasers. 02:39:54 23 A Could you tell me where you get 7.5.1? 02:37:12 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 25 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of is an effective heat 02:39:36 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46
23 A Could you tell me where you get 7.5.1? 02:37:12 23 Q And then the I believe you also said the 02:39:56 24 Q You might have to cross-reference it with the 02:37:22 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 25 blockage of emitted light? 02:40:03	2 device? 02:35:44 3 A Well, I haven't done a industrial review of LiDAR 02:35:44 4 devices, so what I can say is that, from the documents 02:35:52 5 I've read, the Waymo device uses and on 02:35:55 6 the Fuji device, from what I've been told and I 02:36:03 7 haven't actually seen the board in detail that Fuji 02:36:06 8 device also uses diodes. I don't know if any 02:36:09 9 other laser LiDAR unit uses at this 02:36:13 10 point. 02:36:18 11 Q So you didn't identify any others besides the 02:36:18 12 Waymo and Fuji device in your declaration? 02:36:21 13 A I didn't identify any others because I haven't 02:36:22 14 done analysis. 02:36:27 15 Q Paragraph 49 of your declaration, you cite the 02:36:28 16 Liu textbook again; is that correct? 02:36:37 17 A Yes. 02:36:39 18 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 19 textbook? 02:36:57 20 A Yes, I have it in front of me. 02:36:58	Q So page 224 of the Liu textbook, you would agree, 02:38:55 is not discussing LiDAR specifically; is that fair? 02:39:02 A Well, it's it's discussing it's discussing 02:39:05 the packaging of high-power semiconductor lasers are 02:39:09 used in LiDAR, but it does not, agree with you, call out 02:39:12 LiDAR specifically. 02:39:17 Q It doesn't say use these designs in a LiDAR 02:39:17 system? 02:39:20 A This book the context of this book is is 02:39:20 the packaging of the lasers, not the applications, so I 02:39:24 would agree with you that LiDAR is not called out or 02:39:28 mentioned. 02:39:30 Q And I believe you say that a known disadvantage 02:39:31 of
24 Q You might have to cross-reference it with the 02:37:22 24 downside of underhanging laser diodes is potential 02:40:00 25 the Liu text itself. 02:37:25 25 blockage of emitted light? 02:40:03	2 device? O2:35:44 A Well, I haven't done a industrial review of LiDAR 02:35:44 devices, so what I can say is that, from the documents 02:35:52 Five read, the Waymo device uses and on 02:35:55 the Fuji device, from what I've been told and I 02:36:03 haven't actually seen the board in detail that Fuji 02:36:06 device also uses diodes. I don't know if any 02:36:09 other laser LiDAR unit uses at this 02:36:13 point. O2:36:18 Q So you didn't identify any others besides the 02:36:18 Waymo and Fuji device in your declaration? O2:36:21 A I didn't identify any others because I haven't 02:36:22 done analysis. O2:36:27 Q Paragraph 49 of your declaration, you cite the 02:36:28 Liu textbook again; is that correct? O2:36:39 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 textbook? O2:36:57 A Yes, I have it in front of me. O2:36:58 And on 02:35:00	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of is an effective heat 02:39:31 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:48 20 high-powered laser diode applications? 02:39:50
25 the Liu text itself. 02:37:25 25 blockage of emitted light? 02:40:03	2 device? O2:35:44 A Well, I haven't done a industrial review of LiDAR 02:35:44 devices, so what I can say is that, from the documents 02:35:52 F've read, the Waymo device uses and on 02:35:55 the Fuji device, from what I've been told and I 02:36:03 haven't actually seen the board in detail that Fuji 02:36:06 device also uses diodes. I don't know if any 02:36:09 other laser LiDAR unit uses at this 02:36:13 Doint. O2:36:18 Q So you didn't identify any others besides the 02:36:18 Waymo and Fuji device in your declaration? 02:36:21 A I didn't identify any others because I haven't 02:36:22 done analysis. O2:36:27 Q Paragraph 49 of your declaration, you cite the 02:36:28 Liu textbook again; is that correct? 02:36:37 A Yes. O2:36:39 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 textbook? O2:36:57 A Yes, I have it in front of me. O2:36:58 And Your declaration at paragraph 49 includes 02:37:00 Figure 7.5.1 from Liu; correct? 02:37:09	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of is an effective heat 02:39:36 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:54 21 A I would go further to say that heat conduction is 02:39:50 22 important for all semiconductor diode lasers. 02:39:54
Page 59 Page 61	2 device? O2:35:44 A Well, I haven't done a industrial review of LiDAR 02:35:44 devices, so what I can say is that, from the documents 02:35:52 Five read, the Waymo device uses and on 02:35:55 the Fuji device, from what I've been told and I 02:36:03 haven't actually seen the board in detail that Fuji 02:36:06 device also uses diodes. I don't know if any 02:36:09 other laser LiDAR unit uses at this 02:36:13 point. O2:36:18 Q So you didn't identify any others besides the 02:36:18 Waymo and Fuji device in your declaration? 02:36:21 A I didn't identify any others because I haven't 02:36:22 done analysis. O2:36:27 Q Paragraph 49 of your declaration, you cite the 02:36:28 Liu textbook again; is that correct? 02:36:37 A Yes. O2:36:39 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 textbook? O2:36:57 A Yes, I have it in front of me. O2:36:58 Q And your declaration at paragraph 49 includes 02:37:00 Figure 7.5.1 from Liu; correct? 02:37:09 A Could you tell me where you get 7.5.1? 02:37:12	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of sis an effective heat 02:39:36 16 conduction; correct? 02:39:41 17 A That is correct. 02:39:41 18 Q And you agree with me that heat conduction and 02:39:42 19 other thermal considerations are important for 02:39:46 20 high-powered laser diode applications? 02:39:54 21 A I would go further to say that heat conduction is 02:39:56 22 important for all semiconductor diode lasers. 02:39:56
	2 device? O2:35:44 A Well, I haven't done a industrial review of LiDAR 02:35:44 devices, so what I can say is that, from the documents 02:35:52 Five read, the Waymo device uses and on 02:35:55 the Fuji device, from what I've been told and I 02:36:03 haven't actually seen the board in detail that Fuji 02:36:06 device also uses diodes. I don't know if any 02:36:09 other laser LiDAR unit uses at this 02:36:13 Q So you didn't identify any others besides the 02:36:18 Waymo and Fuji device in your declaration? 02:36:21 A I didn't identify any others because I haven't 02:36:22 done analysis. 02:36:27 Q Paragraph 49 of your declaration, you cite the 02:36:28 Liu textbook again; is that correct? 02:36:37 A Yes. 02:36:39 Q Okay. And I believe you cite page 224 of the Liu 02:36:41 textbook? 02:36:57 A Yes, I have it in front of me. 02:36:58 A Yes, I have it in front of me. 02:37:00 Figure 7.5.1 from Liu; correct? 02:37:09 A Could you tell me where you get 7.5.1? 02:37:12 A Could you might have to cross-reference it with the 02:37:22	Q So page 224 of the Liu textbook, you would agree, 02:38:55 3 is not discussing LiDAR specifically; is that fair? 02:39:02 4 A Well, it's it's discussing it's discussing 02:39:05 7 5 the packaging of high-power semiconductor lasers are 02:39:09 6 used in LiDAR, but it does not, agree with you, call out 02:39:12 7 LiDAR specifically. 02:39:17 8 Q It doesn't say use these designs in a LiDAR 02:39:17 9 system? 02:39:20 10 A This book the context of this book is is 02:39:20 11 the packaging of the lasers, not the applications, so I 02:39:24 12 would agree with you that LiDAR is not called out or 02:39:28 13 mentioned. 02:39:30 14 Q And I believe you say that a known disadvantage 02:39:31 15 of

Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 8 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY



Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 9 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY



Case 3:17-cv-00939-WHA Document 588-16 Filed 06/12/17 Page 10 of 10 CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 LiDAR system; correct? 03:08:02 2 (Exhibit 37 was marked for 03:05:31 3 identification by the Court Reporter.) 03:05:33 4 BY MR. NEWTON: 03:05:33 5 Q Okay. Dr. Lebby, if you go to Exhibit No. 37, 03:05:34 6 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:38 7 your declaration. 03:05:42 8 Do you recognize this as the '037 patent? 03:05:44 9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:55 13 Q And that's just a single printed circuit board, 03:05:51 14 A T believe this is a single printed circuit board, 03:05:55 15 A I believe this is a single printed circuit board, 03:06:05 16 Q And this is — patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:25 18 A The patent doesn't mention LiDAR at all. It just 03:06:15 19 talks about the process to drill holes into a printed 03:06:15 10 circuit board and position hidden conductive layers. 03:06:22 24 A That's my understanding of this patent. 03:06:37 2 Q Kay. And it doesn't talk about 03:06:37 2 Q May and it doesn't talk about 03:06:37 3 but they are not directly called out in this patent. 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 8 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:34 2 (Correct? 03:06:25 2 (Correct? 03:06:26) 2 (Correct? 03:06:26) 3 but they are not directly called out in this patent. 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:07 8 LiDAR system; correct? 9 A Creation file trade secrets that I and in the Jaffe 23:08:81 2 A T I tild Anot cite them to show that Uberused 03:08:12 5 Exhibit I document. 03:08:
3 identification by the Court Reporter.) 03:05:33 4 BY MR. NEWTON: 03:05:33 5 Q Okay. Dr. Lebby, if you go to Exhibit No. 37, 03:05:34 6 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:34 7 your declaration. 03:05:42 8 Do you recognize this as the '037 patent? 03:05:44 9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit board, 03:05:51 15 A I believe this is a single printed circuit board, 03:05:51 16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:22 21 Q Okay. And it doesn't talk about 1 of 20:06:02 22 (22 (23 (24 A That's my understanding of this patent. Doesn't 03:06:37 23 (24 A That's my understanding of this patent. Doesn't 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:55 5 Scholz dissertation, the '109 patent, the German patent, 03:06:55 5 Scholz dissertation, the '109 patent, the German patent, 03:06:55 5 Scholz dissertation, the '109 patent, the German patent, 03:06:55 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04
4 BY MR. NEWTON: 5 Q Okay. Dr. Lebby, if you go to Exhibit No. 37, 03:05:34 6 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:32 7 your declaration. 03:05:42 8 Do you recognize this as the '037 patent?' 03:05:44 9 A Yes, I recognize it. 03:05:45 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board?' 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:55 14 not multiple printed circuit boards? 03:06:05 15 A I believe this is a single printed circuit board, 03:06:05 16 Q And this is — patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:12 20 circuit board and position hidden conductive layers. 03:06:22 21 Q Okay. And it doesn't talk about 03:06:29 22 (22 (23 (24) A That's my understanding of this patent. Doesn't 03:06:37 2 (24) A That's my understanding of this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:45 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 5 Schloitz dissertation, the '109 patent, the German patent, 03:06:55 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example?
5 Q Okay. Dr. Lebby, if you go to Exhibit No. 37, 03:05:34 6 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:38 7 your declaration. 03:05:42 8 Do you recognize this as the '037 patent? 03:05:44 9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 03:05:55 15 A I believe this is a single printed circuit board. 03:05:55 16 Q And this is — patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03 3 Page 74 1 03:06:37 2 A That's my understanding of this patent. Doesn't 03:06:37 2 A That's my understanding of this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:45 5 Scholz dissertation, the '109 patent, the German patent, 03:06:55 6 and the '037 patent, and you haven't cited any evidence 03:06:55 7 in your declaration in that someone has actually taken the 03:07:04 7 these references or these teachings to develop its 03:08:24 7 these references were cited to show 03:08:24 10 state-of-the-art in technology of printed circuit boards 03:08:24 11 and — and recent placement in alignment, things like 03:08:32 12 Q Nday. So the answer tomy question is "correct"?" 03:08:39 14 A I did not use these references to show anything 03:08:44 15 about Uber, just where the technology is in the — from 03:08:45 16 an experienced engineer. 03:08:54 17 Q Okay. If you go to paragraph 59 of your 03:08:58 19 99? 20 A Yes, I see that. 03:09:08 21 Q And these trade secret numbers refer to the PCB 03:09:24 22 design schematics and layouts for the transmit boards in 03:09:27 Page 76 2 You didn't consid
6 Deposition Exhibit No. 37, which is Exhibit No. 8 to 03:05:38 7 your declaration. 03:05:42 8 Do you recognize this as the '037 patent? 03:05:44 9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 03:05:55 15 A I believe this is a single printed circuit board, 03:05:55 16 Q And this is
7 your declaration. O3:05:42 B Do you recognize this as the '037 patent? O3:05:44 9 A Yes, I recognize it. O3:05:56 O Q And this is directed to a multilayer printed 03:05:47 11 circuit board? O3:05:50 O And that's just a single printed circuit board, 03:05:51 O Q And that's just a single printed circuit board, 03:05:55 A I believe this is a single printed circuit board 03:05:55 A I believe this is a single printed circuit board 03:06:05 A The patent doesn't mention LiDAR at all. It just 03:06:05 I an experienced engineer. O3:06:15 O Q kay. And it doesn't talk about 03:06:15 O Q kay. And it doesn't talk about 03:06:22 O Okay. And it doesn't talk about 03:06:23 O Okay. And it doesn't talk about 03:06:37 Page 74 T Considered. O Okay. On the vare not directly called out in this patent. O Os:06:41 O Okay. And so we have looked at the Liu textbook, the 03:06:55 S Cholz dissertation, the '109 patent, the German patent, 03:06:55 A Tothese references or these teachings to develop its 03:08:28 Not the system; correct? O3:06:24 O These references or these teachings to develop its 03:08:28 Not the system; correct? O3:08:24 O That is correct? O3:06:25 O A These references or these teachings to develop its 03:08:28 In technology of printed circuit boards 03:08:28 I and and recent placement in alignment, things like 03:08:32 O Okay. So the answer to my question is "correct" 03:08:39 I A I did not use these references or these teachings to develop its 03:08:24 A Yes, I see that Ois op paragraph 59 of your 03:08:55 O A Yes, I see that. O 3:09:09:08 O A Okay. So the answer to my question is "correct" 03:09:09:09 O A Yes, I see that. O 3:09:09:08 O A Yes, I see that. O 3:09:09:09 O A Yes, I see that. O 3:09:09:09 O A Yes, I see that. O 3:09:09:09 O A Okay. I for the transmit boards in 03:09:29 O A Now talked earlier about your materia
8 Do you recognize this as the '037 patent? 03:05:44 9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 11 and and recent placement in alignment, things like 03:08:28 11 circuit board? 03:05:51 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 A I did not use these references to show anything 03:08:44 15 A I believe this is a single printed circuit board, 03:05:56 16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers, 03:06:22 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:23 Page 74 1 03:06:37 Page 76 1 03:06:37 Page 76 1 1 03:06:41 Page 76 1 1 03:06:37 Page 76 1 1 03:06:37 Page 76 1 1 03:06:41 Page 76 1 1 03:06:42 Page 76 1 1 03:06:45 Page 76 1 1 03:06:45 Page 76 1 1 03:06:47 Page 76 1 1 03:06:49 Page 74 1 1 03:06:47 Page 76 1 1 03:06:47 Page 76 1 1 03:
9 A Yes, I recognize it. 03:05:46 10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 03:05:55 15 A I believe this is a single printed circuit board, 03:05:56 16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:25 21 Q Okay. And it doesn't talk about 03:06:25 22 03:06:029 24 A That's my understanding of this patent. Doesn't 03:06:37 25 discuss 03:06:37 2 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 tip Okay. You didn't considered what was shown to me in the 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
10 Q And this is directed to a multilayer printed 03:05:47 11 circuit board? 03:05:50 12 A That is correct. 03:05:51 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 03:05:55 15 A I believe this is a single printed circuit board o3:05:55 16 Q And this is – patent is not in the field of 03:06:05 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:22 21 Q Okay. And it doesn't talk about 03:06:29 22 03:06:25 23 03:06:25 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:37 2 Waymo's GBR3 LiDAR device? 03:09:24 24 Q And so we have looked at the Liu textbook, the 03:06:44 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04
11 circuit board? 12 A That is correct. 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 15 A I believe this is a single printed circuit board. 03:05:55 16 Q And this is – patent is not in the field of 03:06:05 17 LiDAR; correct? 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 21 Q Okay. And it doesn't talk about 03:06:22 22 03 03:06:25 23 03:06:25 24 A That's my understanding of this patent. 25 Dash they are not directly called out in this patent. 26 Oxad so we have looked at the Liu textbook, the 03:06:44 27 Q And so we have looked at the Liu textbook, the 03:06:54 28 and the '037 patent, and you haven't cited any evidence 03:06:59 37 in your declaration that someone has actually taken the 03:07:04 10 carrent placement in alignment, things like 03:08:32 11 and and recent placement in alignment, things like 03:08:35 11 and that's the only reason I cited them. 03:08:35 11 That that's the only reason I cited them. 03:08:35 13 Q Okay. So the answer to my question is "correct?" 03:08:34 14 A I did not use these references to show anything 03:08:44 15 A I did not use these references to show anything 03:08:44 16 A I did not use these references to show anything 03:08:44 16 an experienced engineer. 17 Q Okay. If you go to paragraph 59 of your 03:08:54 16 an experienced engineer. 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 18 declaration here, you discuss Trade Secret Nos. 94 to 03:08:58 19 99? 10 3:09:08 20 A Yes, I see that. 21 Q And these trade secret numbers refer to the PCB 03:09:29 22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 24 A That is correct. 25 Q And we talked earlier about your materials 26 Q And we talked earlier about your materials 27 You didn't consider these specific design files 28 or patental from the conductive transmit boards i
12 A That is correct. 13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 15 A I believe this is a single printed circuit board. 03:05:55 16 Q And this is — patent is not in the field of 03:06:01 17 LiDAR; correct? 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:25 21 Q Okay. And it doesn't talk about 03:06:22 22 03 3 correct? 23 03:06:25 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:37 A That's my understanding of this patent. Doesn't 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 1
13 Q And that's just a single printed circuit board, 03:05:51 14 not multiple printed circuit boards? 03:05:55 15 A I believe this is a single printed circuit board. 03:05:56 16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03 1; correct? 03:06:29 24 A That's my understanding of this patent. Doesn't 03:06:33 Page 74 1 03:06:37 2 Dand we talked earlier about your materials 03:09:27 2 Dand we have looked at the Liu textbook, the 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 7 in your declaration that someone has actually taken the 03:07:04
14 not multiple printed circuit boards? 15 A I believe this is a single printed circuit board. 03:05:56 16 Q And this is – patent is not in the field of 03:06:01 17 LiDAR; correct? 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25 23 03:06:25 24 A That's my understanding of this patent. 25 discuss 03:06:37 Page 74 2
15 A I believe this is a single printed circuit board. 03:05:56 16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:02 03:06:25 23 15 (correct? 03:06:29 03:06:25 24 A That's my understanding of this patent. Doesn't 03:06:33 Page 74 1 03:06:37 Page 74 1 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:29 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 15 about Uber, just where the technology is in the from 03:08:47 16 an experienced engineer. 03:08:53 17 Q Okay. If you go to paragraph 59 of your 03:08:58 18 declaration here, you discuss Trade Secret Nos. 94 to 03:08:58 19 99? 03:09:08 20 A Yes, I see that. 03:09:08 21 Q And these trade secret numbers refer to the PCB 03:09:12 22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 03:09:26 24 A That is correct. 03:09:26 25 Q And we talked earlier about your materials 03:09:27 Page 76 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:34 7 the design files, for example? 03:09:45
16 Q And this is patent is not in the field of 03:06:01 17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25 23 03:06:29 24 A That's my understanding of this patent. Doesn't 03:06:33 Page 74 1 03:06:37 Page 74 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:33 2 You didn't consider these specific design files 03:09:34 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 1 CiDAR; correct? 03:06:05 17 Q Okay. If you go to paragraph 59 of your 03:08:58 18 declaration here, you discuss Trade Secret Nos. 94 to 03:08:58 19 99? 03:09:08 20 A Yes, I see that. 03:09:08 21 Q And these trade secret numbers refer to the PCB 03:09:12 22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 03:09:26 24 A That is correct. 03:09:26 25 Q And we talked earlier about your materials 03:09:27 Page 76 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example? 03:09:45
17 LiDAR; correct? 03:06:05 18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:15 20 dricuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25 23 03:06:25 24 A That's my understanding of this patent. 03:06:29 25 discuss 03:06:37 Page 74 1 considered. 03:06:41 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 17 Q Okay. If you go to paragraph 59 of your 03:08:58 18 declaration here, you discuss Trade Secret Nos. 94 to 03:08:58 19 99? 03:09:08 20 A Yes, I see that. 03:09:08 21 Q And these trade secret numbers refer to the PCB 03:09:12 22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 03:09:24 24 A That is correct. 03:09:25 25 Q And we talked earlier about your materials 03:09:27 Page 76 1 considered. 03:09:29 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:34 7 the design files, for example? 03:09:45
18 A The patent doesn't mention LiDAR at all. It just 03:06:05 19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25 (correct? 03:06:29 (correct? 03:06:29 (correct? 03:06:30 (correct) 03:06:30 (correct) 03:06:30 (correct) 03:06:30 (correct) 03:06:30 (correct) 03:06:31 (correct) 03:09:29 (correct) 03:09:29 (correct) 03:09:31 (correct
19 talks about the process to drill holes into a printed 03:06:15 20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25
20 circuit board and position hidden conductive layers. 03:06:18 21 Q Okay. And it doesn't talk about 03:06:22 22 03:06:25 03:06:25 22 design schematics and layouts for the transmit boards in 03:09:20 23 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:37 Page 74 1 03:06:37 Page 74 1 03:06:37 Page 76 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:31 4 Q And so we have looked at the Liu textbook, the 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:54 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 20 A Yes, I see that. 03:09:08 21 Q And these trade secret numbers refer to the PCB 03:09:12 22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 03:09:26 24 A That is correct. 03:09:26 25 Q And we talked earlier about your materials 03:09:27 Page 76 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 Scholz dissertation, the '109 patent, the German patent, 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example? 03:09:45
Q Okay. And it doesn't talk about 03:06:22 22 design schematics and layouts for the transmit boards in 03:09:20 23 waymo's GBR3 LiDAR device? 03:09:24 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:37 Page 74 20:03:06:37 Page 74 20:03:06:41 20:03:03:06:41 20:03:03:06:41 20:03:03:06:41 20:03:03:03:03:03:03:03:03:03:03:03:03:03
22 design schematics and layouts for the transmit boards in 03:09:20 23 Waymo's GBR3 LiDAR device? 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss
23 Waymo's GBR3 LiDAR device? 03:09:24 24 A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:33 Page 74 1 03:06:37 2 03:06:37 2 03:06:37 3 but they are not directly called out in this patent. 03:06:41 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 23 Waymo's GBR3 LiDAR device? 03:09:24 24 A That is correct. 03:09:26 25 Q And we talked earlier about your materials 03:09:27 Page 76 2 You didn't considered. 03:09:29 2 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
A That's my understanding of this patent. Doesn't 03:06:30 25 discuss 03:06:33 Page 74 1 03:06:37 2 03:06:37 2 03:06:37 2 03:06:41 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 24 A That is correct. 03:09:26 25 Q And we talked earlier about your materials 03:09:27 Page 76 2 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
25 discuss Page 74 O3:06:33 Page 74 D3:06:37 Page 76 1
Page 74 1
1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:29 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 1 considered. 03:09:29 2 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
you didn't consider these specific design files 03:09:29 3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 2 You didn't consider these specific design files 03:09:29 3 as part of your declaration; correct? 03:09:33 5 exhibits, and I think they were the Jaffe exhibits. 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files 03:09:29 3 as part of your declaration; correct? 03:09:31 4 A I only considered what was shown to me in the 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files 03:09:29
3 but they are not directly called out in this patent. 03:06:44 4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration; correct? 03:09:31 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
4 Q And so we have looked at the Liu textbook, the 03:06:47 5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example? 03:09:45
5 Scholz dissertation, the '109 patent, the German patent, 03:06:54 6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 5 exhibits, and I think they were the Jaffe exhibits. 03:09:38 6 Q Okay. You didn't look at the native versions of 03:09:41 7 the design files, for example? 03:09:45
6 and the '037 patent, and you haven't cited any evidence 03:06:59 7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example? 03:09:45
7 in your declaration that someone has actually taken the 03:07:04 7 the design files, for example? 03:09:45
8 teachings of these references and applied them to LiDAR: 03:07:07 8 A That is correct. 03:09:46
, , , , , , , , , , , , , , , , , , , ,
9 correct? And I'm just asking what you have cited in 03:07:13 9 Q And you didn't offer an opinion about whether 03:09:46
10 your declaration. 03:07:15 10 these files themselves are trade secrets; correct? 03:09:56
11 A Yeah, what I've cited in my declaration is 03:07:16 11 A I never looked. It wasn't part of my remit to 03:09:59
12 technologies that are common to myself as an experienced 03:07:20 12 look at native files, so I haven't offered any opinions. 03:10:04
13 person in the field where 03:07:24 13 Q And do you agree with me, generally, that, you 03:10:08
14 Q And, I'm sorry, Dr. Lebby, to cut you off, I'm 03:07:27 14 know, based on your experience that a company's design 03:10:12
15 just really under the clock here. 03:07:29 15 files can be trade secrets and include trade secret 03:10:15
16 I just if you can answer them "yes" or "no," 03:07:31 16 information? 03:10:19
17 you don't cite any evidence in your declaration of 03:07:33 17 A It depends. 03:10:19
18 someone taking these references and applying their 03:07:35 18 Also, from my experience with trade secrets is 03:10:24
19 teachings to LiDAR? 03:07:38 19 that you have got to have very clear specificity of your 03:10:27
20 A I have not observed any of these references 03:07:40 20 trade secret. I guess it could be in trade design 03:10:31
21 directly, either being taught or mentioned in LiDAR, but 03:07:44 21 files could be included in that. 03:10:35
22 the technologies within these references are certainly 03:07:49 22 Q And you understand, as part of this case, Waymo 03:10:36
23 something that could be used in LiDAR. 03:07:52 23 has alleged that Anthony Levandowski stole 14,000 files 03:10:42
23 something that could be used in LiDAR. 03:07:52 23 has alleged that Anthony Levandowski stole 14,000 files 03:10:42